



The British Amateur Television Club

CQ-TV

No. 281 – Autumn 2023

C-Coo* TV?

IC-905 - Icom's microwave
and ATV transceiver

An alternative method of
generating FM TV at 5.6GHz

A New Hybrid Television
Transmission System

Small Dishes

How to point an antenna
if you are out portable?

CAT 23 – a grand day out

News from Japan
358 km, 5.7GHz, DATV Success

Modbus controlling
PAs with Arduino boards

IARU Region 1 ATV contest 2023 results

The Charon, a HF up-converter
for the Adalm Pluto

Photograph by David M0YDH
of the G8TA station on Clee Hill.

... and much more inside!

CQ-TV 281

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**Yes, I know they're not Scottish cows... Ed*

Contributions

Contributions for publication or for constructive comment are welcome. The preferred method of communication is by email; all relevant committee email addresses are published in CQ-TV.

Alternatively you can write to us at:
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Summer - Please submit by May 31st
Autumn - Please submit by August 31st
Winter - Please submit by November 30th

Please submit your contribution as soon as you can before the deadline date. Do not wait for the deadline if you have something to publish as it is easier to prepare page layouts where we have contributions in advance.

Contributions can be in almost any file format - except Microsoft Publisher! MS Word is preferred. Pictures should be submitted in high quality as separate files. Pictures embedded in a file are difficult to extract for publication however if you do wish to demonstrate your completed layout, a sample of your finalised work should be submitted at the same time.

Please note the implications of submitting an article detailed in the 'Legal Niceties'



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From the Chairman...

Martin Charman G4FKK

Well, CAT23 (part one), came and went, very successfully I think. It was great to see so many of the members there and to catch up with old friends and to make some new ones. I'd like to thank all those involved in organising the event and those that took the trouble to set up the excellent demonstrations of portable gear, testing equipment, repeater setups and bring some bargains for the sales tables. Rob has written a CAT23 report which you'll find in this issue of CQTV.

CAT 23 part two is our on-line get together which will take place on Saturday, 21 October. You'll be able to log in to the event from around 09:45 and the main proceedings kick off at 10:00.

After some waffle from me, the speakers will be:

10:05 – Tim, MW0RUD. Tim will be discussing the latest developments and future plans for the Ryde receiver. Tim will also be explaining how to configure Ryde to show various useful information on its display and clearing up some of the idiosyncrasies of the .yaml configuration file.

11:00 – Michael, EA7KIR. Michael will give us the low-down on how to get the sound and audio right on our television transmissions and demonstrate his excellent, home brewed PPM (peak programme meter).

12:15 – Lunch.

13:15 – Michael, DL5OCD. Michael will uncover some of the mysteries around his "DATV Not So Easy" software which provides platform independent encoding

and decoding of IP-based transport streams; ideal for our DATV transmitters and receivers.

14:15 – Grant ZLIWTT. Grant will explain his innovative thinking and progress with generating and receiving narrowband TV, providing reliable moving pictures over long distances along difficult RF paths such as transatlantic 29MHz for example.

There will be Q&A sessions after each talk so timings are likely to drift from those I've outlined. A more precise running order, along with Zoom sign-in details and other means of watching, will appear on the BATC forum shortly.

Many thanks to Tammy and David who have, once again, agreed to provide all the production and streaming facilities; so we can look forward to a very professional show.

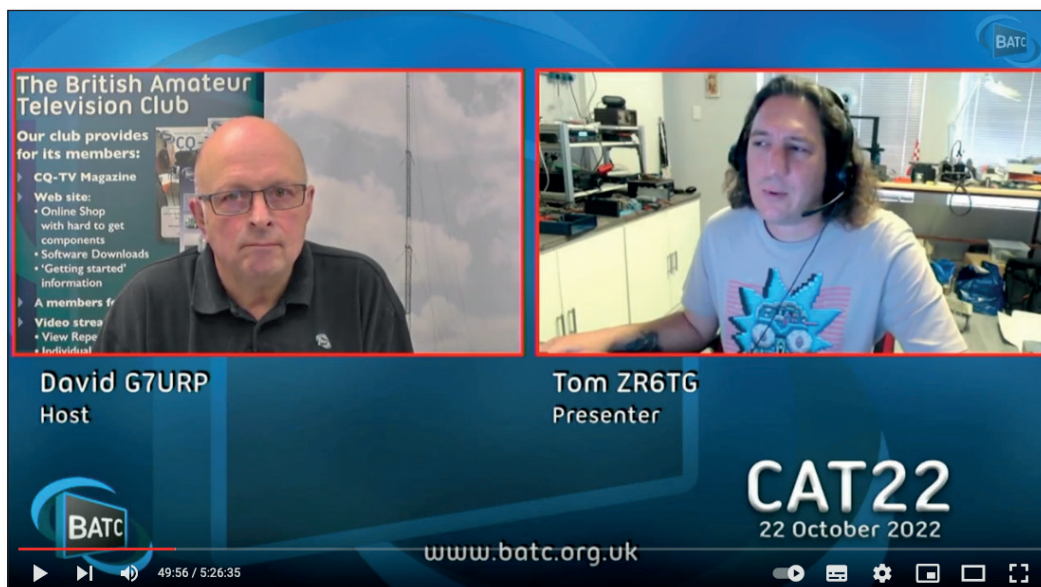
In a previous CQTV magazine I asked for volunteers to join the committee with a view to taking over the membership secretary position from Rob, G8NXG, in due course.

I was delighted to hear from Tony, G3UIS, who has taken up the challenge and was co-opted onto the committee at CAT23. Tony and Rob have been working together since then to ensure a smooth handover.

Many thanks to Tony on behalf of the BATC. 🗣️

73, Martin G4FKK

► Image from last year's CAT22 online session



The Listing

new and renewing members



Rob Burn G8NXG

Well, there is a saying that as your age advances, time goes by more quickly. I can attest to that as once again I have prepared another list for members and it is always a surprise that the publication deadline is reached so quickly!

As has become the norm, the period covered is in effect between deadlines published in CQ-TV, so this list covers members who have joined or renewed between June 1st and August 31st

The Club continues to appeal to ATV enthusiasts across a broad spectrum of countries possibly encouraged by the availability of QO-100. Indeed the weekly Thursday net on QO-100 consistently attracts around 35 viewers on the BATC Streamer in addition to those who could be monitoring via QO-100.

There is also an International Net every Sunday at 12:00 UTC. In fact the streamer can be worth exploring from time to time to check who is maybe using QO-100 or carrying out other experiments.

Although we do lose some members each month, I am pleased to report that this loss is usually balanced by the numbers of new members who join. It's great to also report that we continue to have the support of about 1450 members.

Finally, if all goes to plan Tony G3UIS will take over as our Membership Secretary from October 1st. It remains for me to thank our new and recent members for joining and for our longer term members to thank you for your continuing support of the Club. 📡

Australia		
Denis Pittaway	VK3YLH	Belgrave Heights
Richard Stone	VK4ZMB	Black River
David Hopkins	VK4ZF	Capalaba
Tony Falla	VK3KKP	Castlemaine
Alfred Edwards	VK2YAC	Colyton
Wayne Gooda	VK4YWG	Cranbrook
Richard Searles	VK3VRS	Fountain Gate
Darren Craven	VK3DSA	Lara
Graeme Parr		Melbourne
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Rudy Pycke	ON6PY	Oudenaarde
Lucien Brouckaert	ON7TU	Pittem

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Luc van Achte	ON4AOL	Stekene
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Combe Mathieu	F4FEH	Villeneuve Les Bouloc
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Reinhard Burtschick	ON4SG	Berlin
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Walter Jonat	DK1ZA	Molfsee
Thomas Meyer	DL6YEA	Oetzen
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Frank Spiegel	DG2FSP	Roehrsdorf
Martin Blanz	DL9SAD	Schwieberdingen
Dietmar Barthel	DG0CPG	Stassfurt
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Don Kelly	EI8DJ	Crosshaven
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Renato Campo		Paceco
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Nikolai Shpakovich	UN6PD	Topar
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Jaap Zondervan	PA0OLD	Sint Annaparochie
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Cor Rademeyer	ZS6CR	Secunda
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Juan Piqueras	EA3TA	Sabadell
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Planas Jaume	EA3NE	Terrassa
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Mike Sanders	G8LES	Alton
Graham Felton	GW0FEM	Amlwch
Ralph Moyle	G0UWB	Banbury
John Manley	M1CNJ	Banbury
Roland Rodgeron	G0OUC	Barnsley
Ken Roberts	G8VDP	Barnsley
Alan Fuller	G4OYN	Barton Seagrave
Alan Griffiths	G8LJY	Bath
Peter Morys	G4HQX	Berkeley
Neil Cheese	G1TZX	Birmingham
Viv Green	G1IXE	Bristol
William Woodward		Bristol
Adrian Lambert	G8TNU	Broadstone
James Colwill	G0DQH	Chandlers Ford
Peter Townrow	G6LTB	Cheltenham
Graham Jones	G3VKV	Cheltenham
S Withnall	M0GPC	Cheltenham
John Houldridge	G6KYD	Chessington
Barry Sankey	G7RWY	Coventry
Adrian Munday	G8YOX	Crowland
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Kenneth Aspden	G8WZW	Darwen
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Sharon Rossiter		Enfield
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Michael Rainbow	G6OTP	Gloucester

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Paul Elliott	G4MQS	Leicester
Andrew Thornett		Lichfield
David Houghton	G0MXW	Liverpool
Ross Sissons	M7CNN	London
Tarsam Singh Bimbura	G8WKU	London
Adrian Dodd	M0PAI	Macclesfield
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Frank Beesley	G8CZE	Manchester
Steve McKinty	G8OYA	Moreton-in-Marsh
Paul Nickalls	G8AQA	Much Wenlock
Andrew Garratt	M0NRD	Newark-on-Trent
David Fielding	G8KHU	Newbury
Peter Grannell	G4TQB	Newcastle-under-Lyme
Paul Bowen	M0PNN	Newport
Gwil Jones	GW6PVK	Wrexham
Philip Hosey	M10MSO	Omagh
Darren Rainer	G4VTQ	Ottery St. Mary
Christopher Worlledge	M1ANO	Paignton
Allan Copland	GMISXX	Paisley
David Houlden	G1OCN	Portland
Christopher Tidwell	G0DAE	Portsmouth
Anthony Stone	G3UIS	Poulton-Le-Fylde
Andy Boyne	G4RFX	Preston
Tom Grady	G6IGA	Reading
Phil Hayes	M0PIT	Roade
Geoff Boyce	M1AHN	Ross-on-Wye
David Carter	G8PGO	Sapcote
Adrian Jepson	2E0USA	Sheffield
Paul Archer	M0PJA	Sheffield
Steve Porter	G4NHP	Sidcup
Richard Horton	G4AOJ	Solihull
John McCarthy	G7JTT	Southampton
Mark Johnson	G4ZRT	Southampton
Jason Petrou	M0MZF	Southampton

Barry Shane	G1JOL	Spalding
Alan Mayhew	G8TQK	Sutton
Derek Linford	G1INC	Sutton Coldfield
Dennis Fitch	G8IMN	Sutton Coldfield
Peter Yarde	G8DKC	Swadlincote
Phil Bourke	M0IMA	Swanscombe
Derek Blight	G0PGL	Taunton
John Alexander	M6JAX	Telford
John Pryke	G8BXH	Watford
Colin Simon	M7DJL	Weymouth
John Grandshaw	G8IKP	Weymouth
Mervyn Northover	M0MIN	Whitfield
Robbie Kiger	M1ROK	Wigan
Anthony Hornby	G1HBD	Wokingham
Wayne Hughes	M7WLH	Wolverhampton
Martin Dixey	G4OSU	Wolverhampton
Harry Hughes	M7HJH	Wolverhampton

US

Roger Paskvan	WA0IUJ	Bemidji
Dale Hagert	W0IR	Eagan
Charlie Short	K9BIF	Goshen
Don Coker	KM6TRZ	Ladera Ranch
Gregory Ross	AI0B	Laporte
Michael McClanahan	KA5TDA	Moore
Jeff Davis	KE9V	Muncie
Lou McFadin	W5DID	Orlando
Zygmunt Skrobanski	G3XDZ	Roswell
Richard Hoover	AB0CV	Saint Louis
Jim Nagle	KF4OD	West Palm Beach
William Rafus	KD4FRB	Weston

Jamboree on the Air 2023

21/22 October

Are you helping a local Scout group get on air for this annual Scout event? Or would you like to demonstrate TV at a local event to you?

The UK Scout Association headquarters will be hosting 3 stations at Gilwell Park GB2GP (Epping Forest), Youlbury (Oxford) and Broadstone Warren GB2BW (Sussex)..

Look out for the TV stations from the Scouts on QO-100 over the weekend.



Activity and Contests

Clive Reynolds G3GJA

Christmas repeater contest and Christmas ATV activity ladder

These two events will run concurrently from Saturday 23 December 2023 to Tuesday 2 January 2024 inclusive. Contacts for the repeater contest can also be entered into the activity ladder. The rules for both are unchanged and can be found here: https://wiki.batc.org.uk/Christmas_2023_Repeater_Contest_%26_Activity_Challenge

Remember that there is a £100 prize for the winning repeater group.

Activity weekends reminder

- ▶ 14-15 Oct activity weekend - 2m and down plus 23cm
- ▶ 11-12 Nov activity weekend - 70cm and 23cm
- ▶ 9-10 Dec activity weekend - 13cm and up plus 23cm (coincides with Veron event)

Activity reports

There were few participants in the August activity weekend and those that were on struggled to get contacts. Gareth G4XAT and Rob M0DTS failed to get a locked picture on 70cm and Rob only just managed to work myself on 70cm and 23cm due to extremely deep QSB, at times reaching 20dB on both bands.

Tropo accompanied the high pressure at the start of September. For those of us on the east side of the UK, the best paths were north-south. Again, M0DTS was able to use GB3EY and Alan G0KOO in Boston also accessed it.

Late on the evening of the 4 September, conditions were so good to the south-east that I was able to see GB3TN, albeit marred by heavy radar interference. I was alerted by a blip on the Portsdown bandviewer that peaked to -15dBm. It's the first time I've seen TN in Hull, so it was an exceptional lift.

Repeater news

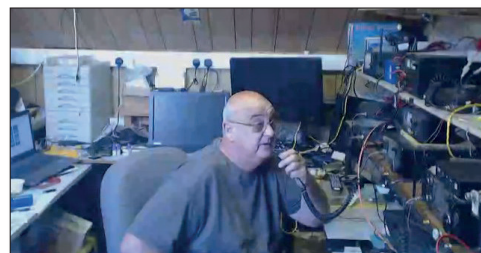
The west Yorkshire DATV repeater GB3YT on 1316MHz at Mirfield closed earlier in the year when its sponsors/engineering team felt that they were unable to continue supporting it when it broke down. Fortunately, a group of ATVers in south Yorkshire got together to form the South Yorkshire DATV Group and were able to negotiate the transfer of the NoV and hardware.

The hardware had been in the roof of a barn for a decade or more and consequently needed a lot of cleaning. Individual modules are undergoing tests to identify the cause of the repeater failing, but no definite cause of the transmitter fault has been found so far. The DTX1 encoder/modulator is under suspicion though, as its output failed at one point. The group would be keen to hear from anyone that can assist with the upgrade of the DTX1 firmware to the last release.

The group has been looking for sites around the Barnsley area. Approaches have been made to a couple of site owners but nothing concrete has come out of it. In the meantime, Ken G8VDP is running the Tx gear as an attended beacon between 9am and 9pm from his QTH at Birdwell near Barnsley. If Ken swaps the Alford Slot antenna for his beam it can just be seen in Hull.

▶ GB3YT temporary antenna

▶ Ken G8VDP using the test beacon



▶ GB3TN on 1316MHz FMATV

▶ GB3TN heavily affected by radar

The group is looking for interested ATVers to join and help support the rebirth of GB3YT. Their web site (sydatv.org.uk) is under construction but there are links to their PayPal account and a membership email address. (membership@sydatv.org.uk)

IC-905 - Icom's microwave and ATV transceiver

Dave Crump G8GKQ



I have had two opportunities to test the IC-905 which is Icom's first entry into the microwave and ATV market.

Here are my first impressions; I'm not sure that many BATC members will purchase one (although I know that there is at least one). It does have the potential to increase FM ATV activity.

Description

The IC-905 is more of a system than a rig. It comprises two (optionally three) units: the controller, the RF unit and the optional 10 GHz transverter.



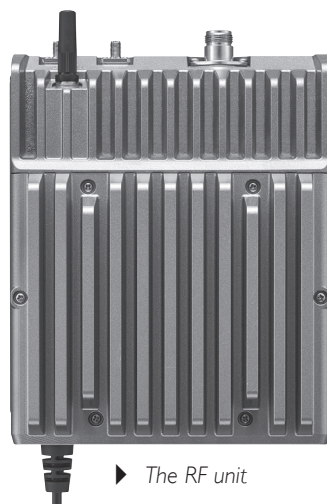
► The IC-905 controller

The controller has the same form factor as the popular IC-705, but has no internal battery. It requires an external 5.5 amp 13.8 volt supply and runs quite hot. The power input, microphone, audio, video and PTT sockets are on either side of the unit.

The controller is connected to the RF unit by a standard shielded ethernet cable which carries both power and data. This enables it to be sited close to the aerials to reduce feeder loss.

The RF unit has a single N socket for 144, 432 and 1296 MHz aerials. It has separate SMA sockets for the 2.4 GHz and 5.7 GHz aerials; a third SMA socket is used to connect a GPS receiver aerial.

A derived 10 MHz reference is output on a BNC socket. The sockets are distributed between the top and the bottom of the unit.



► The RF unit

The optional 10 GHz transverter connects to the RF unit through a bespoke cable fitted with 10-pin connectors, and uses the RF unit's 2.4 GHz connector.

It provides a pass-through SMA output for 2.4 GHz, and another SMA socket for the 10 GHz aerial. It takes a 10 MHz reference input from the RF unit on a BNC socket.



► The 10 GHz transverter

A development prototype 24 GHz transverter was exhibited at a recent radio show in Japan.

Capabilities

The IC-905 is capable of FM and SSB on all bands 144 MHz - 5.7 GHz, and FM ATV on the bands 1296 - 5.7 GHz. The 3.4 GHz band is not covered (as it is not available in many countries). Output is 10 W on 144, 432 and 1296, 2 W on 2.4 GHz and 5.7 GHz and 0.5 W on 10 GHz.

The unit is also capable of AM (at reduced power) on all bands. Note that there is no receive (or transmit) coverage in any mode outside the amateur bands, and the upper limit on 23cm is 1300 MHz, so it does not cover the UK ATV repeater output frequencies.

The test unit performed to specification on transmit. It was not possible to perform accurate receive sensitivity measurements. The unit appeared to be sensitive enough for terrestrial operation on all bands but needed a preamp for acceptable reception of QO-100 narrowband on 10 GHz.

Amateur TV operation

The IC-905 will transmit and receive frequency modulated (FM) ATV pictures with a single sound sub-carrier. In the UK, this mode has gradually been replaced by digital DVB-S/S2 over the past 20 years.

Connecting a camera

TV transmission requires a PAL video camera to be connected to provide the picture source; this can be an old camcorder or a more modern alternative such as the BATC PAL VideoSource using a Raspberry Pi Camera.

The audio can be from the first microphone or from a mono audio source. The required leads are not supplied, but can easily be made up from a 3.5mm stereo jack plug; although the manual indicates that a four-terminal jack is required, the ring furthest from the tip is not connected, so a standard three-terminal stereo jack will suffice.

The transmitted picture can be shown alongside the received picture on the touchscreen; either picture can be enlarged to full-screen simply by touching it. Sadly, the frequency tuning control is disabled when full-screen is selected.

An external monitor can be connected to display (or record) the received pictures, and stills can be saved to an SD card inserted into the controller.



► Screenshot showing both transmit and received pictures

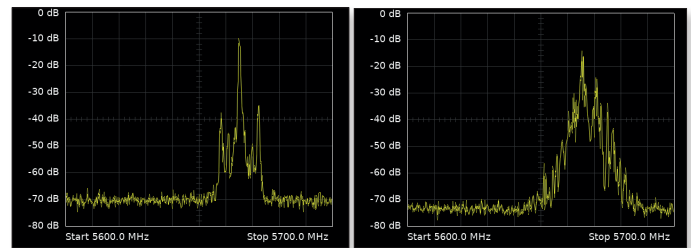
Frequency modulation

The TV modulation standard is not specified in any of the Icom documentation. The FM ATV deviation was measured to be significantly lower than has traditionally been used for ATV in the past.

Pre-emphasis is also applied in the transmitter (with matching de-emphasis in the receiver) but the exact pre-emphasis standard is not stated by Icom. The parameters are compared to those commonly used in the table below.

Equipment	Deviation at Crossover	Pre-emphasis	Audio
IC-905	5 MHz/volt	Yes - Unknown	Nil, 4.5, 6 or 6.5 MHz
BATC 23 cm	8 MHz/volt	CCIR 405-1 (625)	6 MHz
Drone	16 MHz/volt	None	6 MHz and 5.6 GHz

The FM ATV modulation appeared to be SDR-generated and, with the low deviation, gives a tight (for FM ATV) ATV spectrum of about 14 MHz wide. The spectrum is compared with a 5.6 GHz drone transmitter below.



IC 905 FM ATV Spectrum

► Drone TX FM ATV Spectrum

The occupied bandwidth of 14 MHz is approximately 30 times that occupied by a digital ATV transmitter at 333 kHz carrying the same (or better) quality signal in just under 500 kHz.

Note that if the video deviation is increased beyond a certain limit, the transmitter simply cuts out with no warning or explanation.

On-air testing and compatibility

Initial on-air tests were conducted between two IC-905s on 5665 MHz. The received picture quality was about P4 (over 29 km line-of-sight) with one station using the Icom AH-56 5 dBi colinear and the other using a 22 dBi ex-WiFi dish.

The audio was clear, with the welcome facility of an FM squelch on the audio subcarrier - although I have heard reports that this squelch does not work on some production units. It was refreshing to have negligible delay and quick changeover between transmit and receive for video - unlike digital ATV modes.



► The IC-905 received picture captured on an external recorder

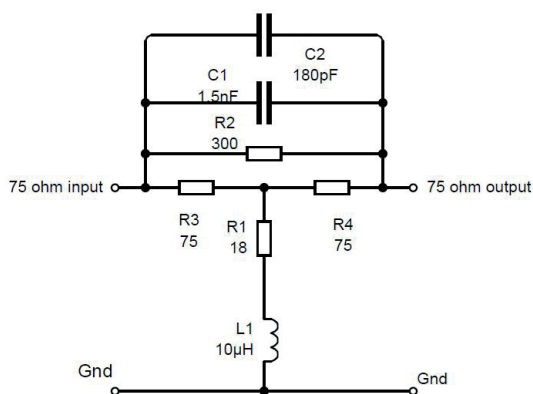
A few ATV repeaters still retain an FM receive capability. Initial tests transmitting into GB3SQ over a distance of 11 km were successful, but the picture quality was poor as it was set up for the more commonly used deviation of 8 MHz/volt.

The repeater keeper Colin G4KLB then installed a video AGC system and further tests a week later gave better results. It is likely that most UK ATV repeaters would need similar modifications to receive ATV transmissions from the IC-905.

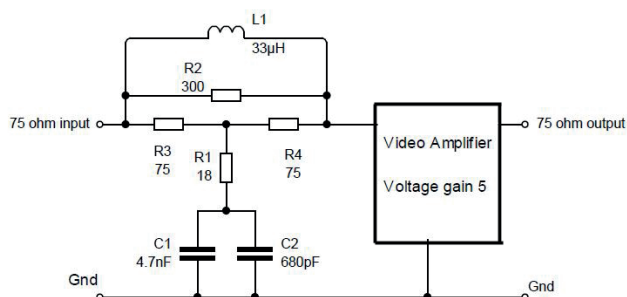
The IC-905 showed significant crushing and tearing of the video when receiving signals from an unmodified 1255 MHz transmitter. There is no facility on the IC-905 to accommodate the wider deviation that causes this, so any such transmitter (or remaining repeaters transmitting wider bandwidth FM ATV) are incompatible with the IC-905 without modification.

Tests were also conducted on 5665 MHz, testing compatibility with the popular (and cheap) drone transmitters and receivers. It could be achieved, but needed significant modifications to the drone equipment. On transmit, the drone transmitter video level needed reducing and pre-emphasis needed to be applied. Some patterning from the high level of the two sound sub-carriers remained visible on the IC-905, but the results were acceptable.

The pre-emphasis circuit below provides enough attenuation to set approximately the correct modulation level for a drone transmitter:



On receive, significant amplification of the video signal was required, and it needed de-emphasis to be applied. The de-emphasis circuit here will need to be used with some amplification on the output of a drone receiver to view the signal from an IC-905 on a normal monitor:



Note that a 75 ohm buffer amplifier might be required after the drone receiver and before the de-emphasis, as these receivers often have a high impedance output.

Digital ATV

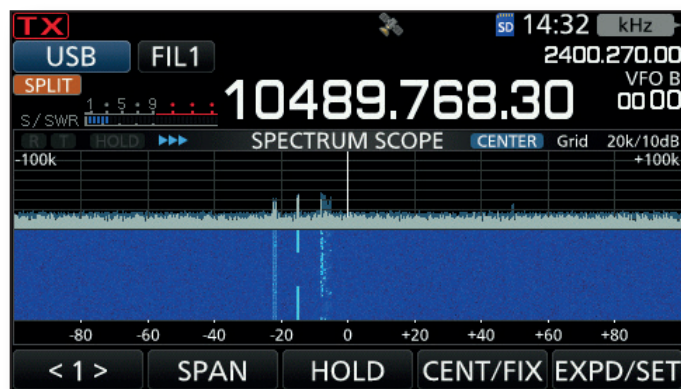
The IC-905 only transmits and receives analogue FM ATV. It is a shame that no attempt has been made to handle DVB-S2 digital ATV which is now the predominant ATV mode in the UK and on the QO-100 satellite. As the unit has no 'IF' input or output, the only likely option for introducing this capability would be an internal firmware upgrade.

Unfortunately, it is unlikely that the internal processor could handle the challenging error-correction processing required for reception, as this is usually handled in custom integrated circuits. The omission of digital ATV might preclude the use of this rig for any ATV operation in the 1296MHz band following the possible future implementation of restrictions to safeguard radio-navigation satellite services (RNSS).

Narrowband operation

The unit performed well for simplex and repeater operation. However, it had no duplex capabilities at all for crossband operation.

When testing QO-100 narrow-band it did not seem possible to "gang" the transmit frequency on 2400 MHz to the receive frequency on 10.489 GHz to allow easy tuning and netting. The absence of any receive capability during transmit made QO-100 operation more difficult.



► The received spectrum during QO-100 operation

Icom is selling a number of co-linear and parabolic aerials to go with the IC-905; these are all vertically polarised, limiting compatibility with most UK microwave operation which is horizontally polarised.

Like and dislikes

I liked:

- ▶ The control interface, which was very intuitive to use (very similar to the IC-705)
- ▶ The fact that the equipment provided a very simple way to get active on many microwave bands
- ▶ The IC-905 performance which was exactly as claimed in the publicity and specification
- ▶ The spectrum and waterfall displays on the receiver (up to 50 MHz wide)

I disliked:

- ▶ The need for a triplexer or switching to connect aerials to the combined 144/432/1296 MHz output.
- ▶ The lack of weatherproofing for the RF unit with sockets on both top and bottom
- ▶ The fact that there was no DC switching signal on the RF output to allow external switching of preamps/PAs. The signal is available on a miniature jack socket on the controller, but needs a custom lead making up for the 10-pin socket on the RF Unit to make it available near where it might be used.

- ▶ The lack of any duplex capability
- ▶ The lack of any digital TV capability, or the potential to add it

Conclusion

I am really pleased that Icom have brought this microwave/ATV transceiver to market. It can only serve to stimulate interest in these aspects of the hobby. It is a polished, capable unit; however, it is not a good fit for the current UK ATV scene - it would have been perfect 20 years ago.

Despite the lack of flexibility, I would love to own one, but the price puts me off: £3549.95 for the basic system and another £1499.99 for the 10 GHz transverter.

You can find out more about the IC-905 in the TX Factor Episode 29 where Noel G8GTZ and I test it in the field, and in the article in the September 2023 issue of RadCom.

Thanks to Icom UK for the loan units and to the TX Factor team for a fun day of testing and filming. 📺

You can never have enough computer monitors

Keith Le Boutillier GU6EFB

Do you have an older iPad or tablet that is now outdated can't accept upgrades and the latest apps - if so why not easily turn it into an additional computer monitor?

The PC that I use for satellite operation is a Windows 11 computer which has connected to it two PC monitors which is great for displaying the tracking data, maps and telemetry etc but what I really wanted was a small monitor that I could place next to my rig and display my logging software allowing for quick and easy entry of QSOs without having to keep looking to my right at the main monitors.

Looking at online options for small monitors I found most small monitors to be far more than I wanted to pay.

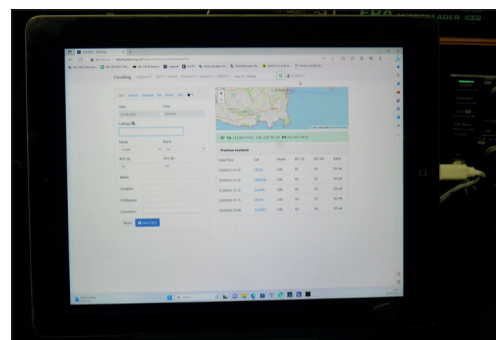
While searching the internet I found information on software called *Splashtop Wired XDisplay*.

This software turns your iPad, Android tablet, Kindle or smartphone into a high performance extra monitor for your computer - this sounded too good to be true as I have an old iPad 2 which is now too old to receive most updates so has more or less become redundant.

How do you make this all work?

Download Xdisplay agent for PC from <https://www.splashtop.com/wiredxdisplay> and install on your PC. Next go to the appstore and search and download Splashtop Wired XDisplay and install on your iPad or tablet. Just follow the on screen prompts to set it all up.

Next connect your iPad or tablet to your PC via a USB cable, I have purchased a one metre cable and this works fine, then run Xdisplay on your iPad and PC and your iPad will now be recognised as an additional PC monitor.



I also 3D printed a small desk stand to hold the iPad

So there you have it – how to make good use of a redundant iPad as an additional PC monitor. 📺



An alternative method of generating FM TV at 5.6GHz...

Jen Easdown G4HIZ

... using a modified video sender unit

For some time, a quick and cheap way of getting going with ATV has been to use the FMTV FPV units operating in the 6cm band. More recently, the Icom IC-905 has arrived with 6cm FMTV capability, although at a considerable cost. However, there is a cheap alternative way of generating FMTV at 5.6GHz, using a modified Video Sender unit.

Some years ago, when Maplin was still around, I bought a Nikkai Video Sender system with the intention to modify it for 6cm FMTV use. Unfortunately, on opening the box I found that the unit's didn't seem to cover the frequency of interest ie 5.665GHz and they were consigned to the 'future projects' corner of the shack.



► Ex Maplin Nikkai video sender units

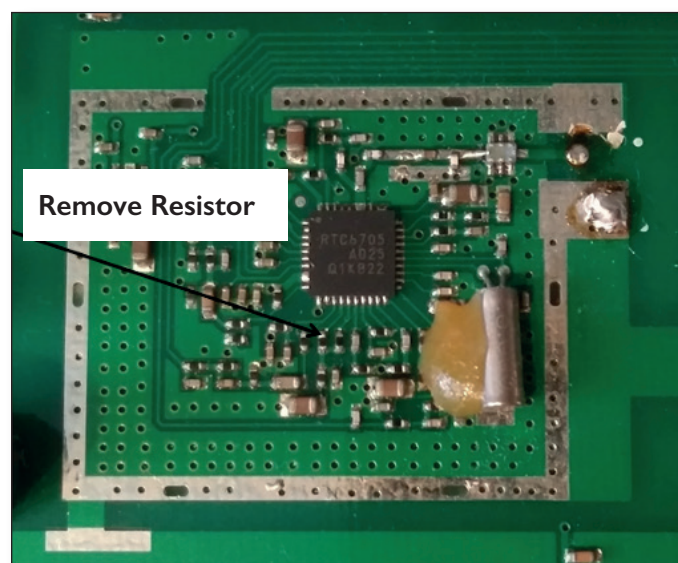
With recent renewed interest, I decided to venture inside the transmitter unit of the system and found that it did indeed cover 5.665GHz, if only the correct frequency sub-band was selected by configuring the required chip input.

Inside the transmitter, the RF parts are covered by a screening can which after removal revealed the Tx chip to be a RichWave RTC6705. An internet search for the chip gave the datasheet (1). As can be seen from the datasheet extract below, 5.665GHz is one of the featured channel frequencies, when the chip inputs and switches are correctly configured. The chip control pins had internal pull-up resistors and all that was needed was to remove the external pull-down to change the selected frequency sub-band.

Are these units still available, you may ask? Earlier this year I bought a second set for modification from the usual online market place for about £25. There is also another Nikkai type commonly showing up there also (silver case) but these have not been investigated.

Transmitter modification to get 5.665GHz

Having separated the two case parts by removing of the four base screws (under the rubber feet), the unit antenna was disconnected, together with unneeded IR control circuitry. The screening can was then removed by bending the tabs under the PCB. Once the RF circuitry and chip were exposed, the correct frequency could be obtained by removing a zero-Ohm pull-down resistor, as shown (Pin 4, Bx input). Note that the three external switches still have to be set.



► Transmitter modification for 5.665GHz

Removal of the pull-down resistor was all that was needed. Afterwards, the screening can was re-fitted and a short coax connection added to an SMA socket, mounted where the previous IR control socket was located.

	SPI_SE	Band	BX	S	CS[2:0]							
					000	001	010	011	100	101	110	111
5GHz Band	0	A	0	0	5865M	5845M	5825M	5805M	5785M	5765M	5745M	5725M
	0	B	0	1	5733M	5752M	5771M	5790M	5809M	5828M	5847M	5866M
	0	E	1	X	5705M	5685M	5665M	5645M	5885M	5905M	5925M	5945M
	1	SPI	X	X								



three wire SPI control pins

► Extract from RTC6705 datasheet (1), showing available transmit frequency selections



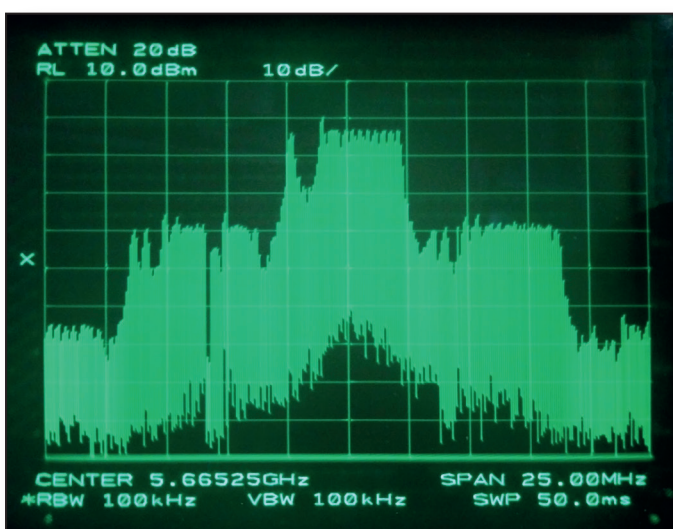
► Short flexible semi-rigid coax added to SMA socket



► Completed transmitter unit

On test the transmitter produced about 8dBm output, with a transmitted spectrum width of around 20-25MHz. The output level proved ample to drive a 10W Ferranti PA. For DC input, the original wallwart power supply provided about 8V, with the unit taking about 200mA, this going into an internal 5V regulator. The original A/V input lead was terminated in a SCART plug, which was cut off and the wire ends terminated in phono plugs.

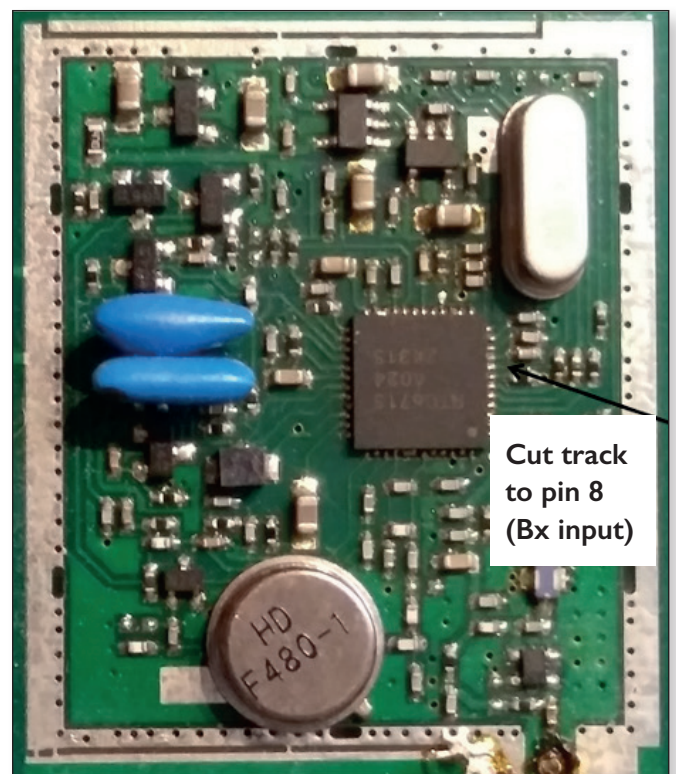
► Output spectrum when modulated with a staircase waveform



There appeared to be some video pre-emphasis on the PCB, but the circuit was not easily worked-out, although during a QSO with another ham, who was using a different system (possibly FPV units) no picture degradation was reported.

Receiver modification to get 5.665GHz

Receiver modification followed pretty much the same process. The receiver chip was a RichWave RTC6715, see (1) for the datasheet. In this case, a pull-down track was cut for the Bx input on pin eight. The receiver drew about 230mA at 8V DC input. In addition, a received signal strength indicator was added by utilising the RSSI output on pin 18.



Cut track to pin 8 (Bx input)

► Receiver modification for 5.665GHz

Operation

The transmitter and receiver were both housed in the same box, with a change-over relay for the RF input/output and a second relay switching the DC supply between transmitter and receiver. An LNA was added, together with a 10W PA and 60cm dish, to make a pretty potent system which was successfully tested in practice. For those who visited BATC CAT23 at the Midland Air Museum, the system was on display in the hanger. 📡

Footnotes:

1. https://www.richwave.com.tw/en/page_prd_new.aspx?ld=8

A New Hybrid Television Transmission System

Grant Taylor VE3XTV



Television has been around for almost 100 years, with many changes as technology has evolved over this time and providing new opportunities. Before the days of high definition (HD 1080i) there were many other lower definition systems, such as 30, 120 and 405 lines to highlight but a few, and it is interesting how they all played their part in history.

Most of the very early development and progress was made in the 1920s. John Logie Baird was a pioneer in this area with his 30 line system using a rotating scanning disk as well as achieving the first transatlantic television transmission plus his work with colour television in the 1940s using a tri-colour wheel.

As we have all found out at times, your area of interest within amateur radio does not always line up with other operators in your location. I now find myself based in North Bay, a smaller city with a 2m repeater, with no UHF infrastructure and therefore next to no interest with anyone wanting to do ATV or DATV.

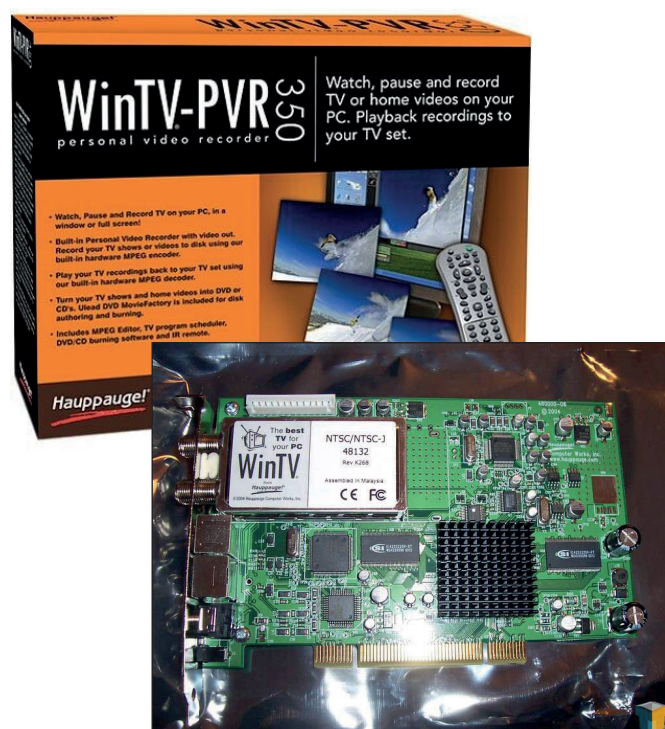
Another limiting factor is the way there are two grades of operators here in Canada; Basic and Advanced, where the Basic users are unable build and use this radio equipment, leaving a fewer number of Advanced users. This makes it near impossible to find someone who would like to do ATV and is an Advanced user or is willing to upgrade to one.

So I needed to come up with a new type of long distance ATV / DATV system, where I can design and build my own equipment and have a greater chance of finding others who are like minded.

With the technology of today, what would be possible? This was the question I found myself asking, therefore I started looking at what was done before. Back in the 2000's when I was working with Con ZL2AFP and Murray ZL1BPU, sending and receiving narrowband television (NBTV) on the 80 meter band, we were trying out a number of different modes, such as 48 x 48, 96 x 72 and a wide range of slow scan television formats.

This has given me a clear understanding of what is and what is not possible, as well as having many years of working in broadcasting which has provided me with a lot of ideas on how this could be done. These days, with the move to online video, on demand and satellite services, it has freed up some of the lower part of the radio spectrum, making it now possible to send television pictures long distance once more.

To send television pictures via sky-wave propagation it is important to display an image no matter how bad the received signal gets, as there will be amplitude and phase effects that will happen while sending a signal through the ionosphere. With the levels of compression that are now possible, the HF spectrum from 10 to 30MHz could be used for television broadcast services. The only amateur radio band that falls within this space, would be 10 meters, from 29 to 29.5 MHz where a new ATV mode could go.



► Figure one, WinTV PVR-350

The PVR-350 shown in figure one is a peripheral component interconnect (PCI) video card that works very much like a sound card, with both audio, video in and out. It is important to remember that the PVR-350 video card came in two variances, one that was NTSC and PAL using the SAA7127H encoder chip and the other type that had the SAA7129H, that has the PAL, SECAM and NTSC encoder.

From my research the US and Canada used the dual-standard whereas in the UK, the EU, Australia and New Zealand the multi-standard type was the standard. This card will also support a wide range of Mpeg 1 and 2 program file formats at different resolutions, these days somewhat limited with HD and H264 encoding, but still useful.

In this case Mpeg2, H264 or even H265 will not work, as error correction will need to be sent, which is not possible, so therefore a new form of digital video compression is required.

With digital compression, the more you add the less overall bandwidth is used, but it comes with poorer signal to noise ratio (SNR) and a higher level of transmitter power. This goes against what we know with radio transmission; the lower the bandwidth, the better the SNR will be. This is where you end up with a standard bell curve for the optimal required bandwidth.

The digital compression approach is shown in figure two, which shows how the video and audio signals are processed. This article will cover the development process of the digital compression part and graphical user interface. At a future date, when I find the time to start on the modulator/demodulator designs, this could be a follow up.

Figure two, shows the transmitter section and the receiver would be much the same but in reverse, starting with the inputs. Video files from local hard drive, uniform resource locator (URL) in the form of some type of internet protocol (IP) stream and the all important video input via the PVR-350 card. All these inputs feed into the media player to display the video frames that are then captured at $240 \times 192 \times 12.5$ in the video scalar. After this, the video frames are cut up into blocks of three, making two key frames and one converted into a movement frame. The chrominance R-Y, B-Y is down converted to 60×48 , the luminance is converted to 120×96 in odd / even blocks, made up of two lots of 120×48 pixels.

Each pixel is eight bits, or a byte, therefore this part of the video processing takes up most of the bandwidth requirements, unlike the wavelet part which is only one bit. The job of the wavelet processor is to send the velocity, or the rate of change between pixels in the x,y direction, providing the extra detail in the video image with minimal bandwidth requirements. The movement information is the sum of the changes and the difference between these three frames.

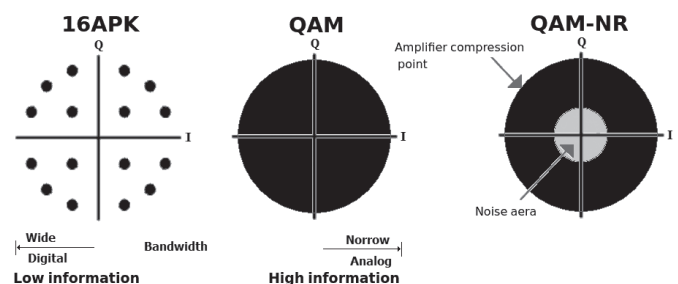
There are many factors to take into account with wavelet blocks, the main one is how much bandwidth will each block take away from the video information and how each of these blocks will be impacted by noise. As with any form of compression, there is always a trade off between required bandwidth vs the quality and the amount of spectrum efficiency that can be optimised for.

The approach I took was to follow what was done within the type B multiplexed analogue components (B-MAC) system, i.e. using time division multiplexing (TDM) and placing each part of the video signal into time slots. These

are made up of two data frames with all the required information for three video frames and so on for the next data frames. The 48 lines of information are modulated onto 24 QAM carriers which can carry more information than the 72/108 FM carriers that Con's NBTv system used.

The audio is done differently to B-MAC; frequency division multiplexing (FDM) is used as it is above video information in frequency. The encoding process used has a lot in common with the compatible quadrature amplitude modulation (C-QuAM) system, as used for AM stereo broadcasting, where R+L is in the amplitude part and the R-L information is within the phase.

As there is no error correction, this has been replaced with noise reduction by controlling the modulated signal in a way whereby the noise will have less of an impact. There are two forms of noise reduction used. One is digital, the other is analog with a type of companding controlling the amplitude and phase components. The digital noise reduction system is an area I am still experimenting with, as there is a number of ways this could be done, therefore there is a lot of testing required.



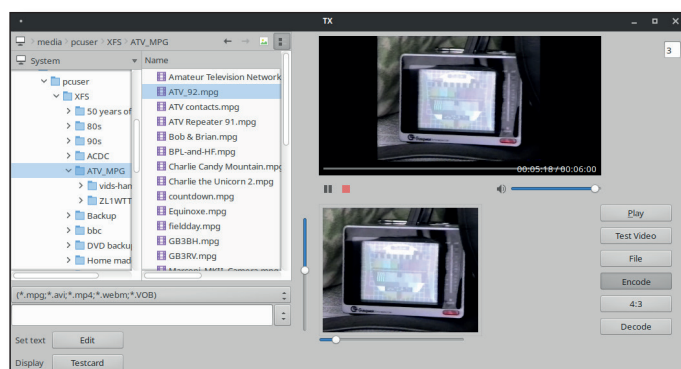
► Figure three, QAM diagram

Figure three shows how it is possible to maximise information within a fixed bandwidth by moving away from digital constellations to an analog QAM system with added noise reduction, where information is a modulated wide ring or a donut shape.

Here is a simple application written to read in a video file, to experiment with a range of different compression ideas as a loopback setup, to compare input to output and compression quality. As you can see, an image that only has a base resolution of 120×96 will provide a watchable picture, that can be transmitted within limited bandwidth with sound.

If anything, this highlights what still can be done with analog television. By adding in a digital layer it is possible to encode more information to enhance the analog video quality. With fuzzy encoding a small error will have very little impact on the overall picture. Under very

noisy receive conditions it will give you an image looking more like an analog TV signal. However, on good signals it is possible to add in an extra layer of digital image processing.



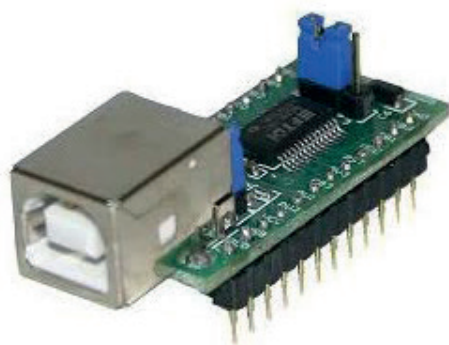
► Figure four, Test application

The good thing about using software is that it makes it easy to change the code and to try out something new. This is why I started with a GUI, as it is not that simple to change the hardware and it gives me a better idea of how these two parts will go together. The TX software in figure four shows the form layout that I have been working with for testing over the past few months in a very simple layout.

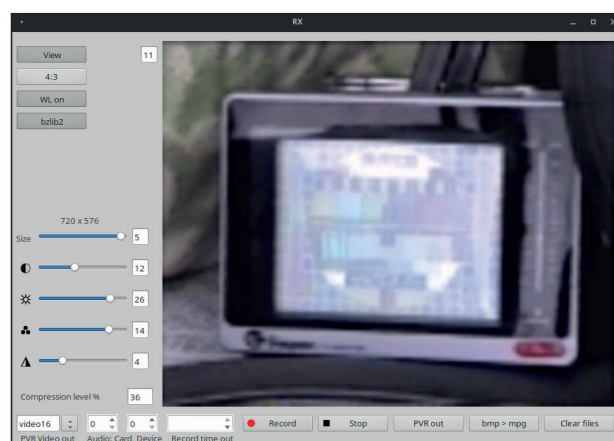
Top left is the file explorer; just below is the URL address box and under that is the test card editor; top right is a media player with captured video viewing box below.

Loopback testing has been done with a universal serial bus (USB) to parallel converter, using the UM245R made by Future Technology Devices

International, that looks like a COM port to the GUI. The plan at this stage is to use this with a field programmable gate array (FPGA), static random access memory (SRAM), digital-to-analogue converter (DAC), analogue-to-digital converter (ADC) and required filters to build the RF modulators and demodulators as I have already simulated a number of the digital signal processing (DSP) blocks for the FPGA and have a basic printed circuit board layout for the modulator.



► Figure five, USB to parallel interface



► Figure six, RX Form layout

Figure six, shows what it would look like from the receiver end without any noise looped back. The picture quality is the about the same as VHS in its day. The controls are to view the display video, wavelet on/off for higher detail and video settings. Note; the values are only for this testing of the software.

The compression is an indication of the ratio of the digital to analog encoding, that may or not be used at a later date. Below are the settings for the PVR-350 video output and audio hardware, with the record time out setting and the BMP to MPG converter. The application sends out a number of BMP images from the decoder to the hard drive, with a WAV file for the audio part. These files are then converted into a Mpeg2 file that can be sent out via the PVR-350 AV output.

Viewer size for:

Size	4:3	16:9
1	120x96	120x68
2	240x192	240x135
3	360x288	360x203
4	480x384	480x270
5	720x576	720x405

Sometimes less is more when it comes to NBTv. In full screen mode you could end up with a lot of unwanted pixel blocks, where the base resolution is 120x96 without wavelet processing, as you can not get something from nothing.

This up-scaled analog video is at the base resolution. By using a digital wavelet transform made up of custom bit block patterns of 4 x 4, it is possible to rebuild a higher resolution of 240 x 192. As this base resolution is divided down from 720 x 576 x 25, the frame rate has two settings of 6.25fps and 12.5fps, where the focus has been on 12.5fps, as this is able to provide steady movement.

By overlaying the pattern blocks to part of the video image it is possible to compare or do a correlation between them. When the best fit is found this is sent as a close representation, at the same time compressing the information that is needed to be sent. This is how picture compression works with JPG files, where the pattern blocks are very much customised for best quality or approximation for lower quality.



► Figure seven, Video out

Figure seven shows the recorded Mpeg2 video file displayed on my reference monitors, from S-Video out from the PVR-350 interface cards, going from video in (TX) to NBTv and back to video out (RX).

Another way of up-scaling is with the use of artificial intelligence (AI), as there are a number of new AI websites that have this function built in for images and videos. With personal AI chips and plugin cards that are not far off, it will soon be possible to take a video image of 240×192 and scale it to 480×384 .

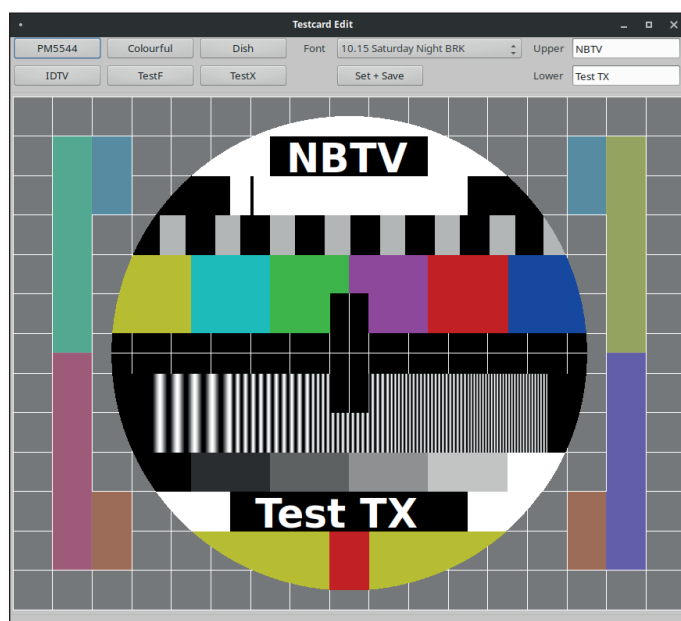
As you can only go so far with this type of up-scaling before the AI has nothing to work with, from experimentation I found the maximum ratio to give good results is 1:4. When you go too far, Figure eight shows what it would look like; yes, it looks sharper with less noise, but it does not look right.



► Figure eight, overscaled with AI

Therefore it could be possible, as with the PVR-350, to loop the video through an AI chip before it is displayed as an extra option for up-scaling of the NBTv video signal. This still could be a few years away yet, before I even start looking at doing something like this, but the idea is there when the time is right.

The test-card editor in figure nine, was added as a quick way to display a video image without setting up a URL or a video file, for testing of code changes. It has six background test-cards, where you type into the text boxes what you want to display in the upper and lower locations. I may or may not do much more with this as it is a bit of a side project from the main NBTv software.

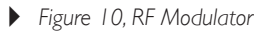


► Figure nine, test-card editor

Figure 10, is showing what I am thinking of in the way of the RF modulator, using a Cyclone II FPGA, with space for the DSP processing blocks and all the switching logic that will be required. As well as using the phase lock loop (PLL) outputs, sent via balun transformers to go between analogue and digital sections, for both the fixed output at 21.25MHz and the variable frequency range of 25.2 to 25.7 MHz.

The SRAM is used to store data frames for the GUI running on the PC via the USB port, where the two SRAM chips will alternate between read and write, as well as making use of the RAM within the FPGA. The analogue signal processor (ASP) block is where I am encoding the analogue noise reduction, followed by the I & Q modulator at the 21.4 MHz IF with a high rejection band pass filter.

The final stage is the RF up-converter to provide the 29 MHz out as low level driver for the RF power amplifier.



With the slow pace I am working at, finding my way through all the design issues, I would expect by the end of 2020s this transmission system should be on the air and making long distance ATV contacts. Therefore projects like this I work on for a few months at a time, this way I can take time out to do other things to avoid burnout and comeback at a later date with new ideas. 🎧

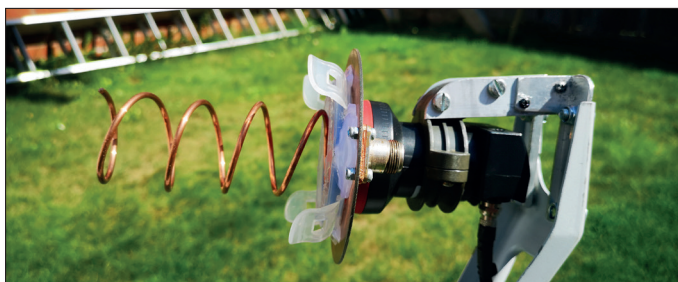
Small Dishes

After being active from home for QO100 it was a natural choice to think about a portable setup seeing as so many portable stations are now active on the satellite.

Now due to my health I can no longer handle heavy items and so I knew it was going to be a challenge to have a set up only using a small dish instead of a one-metre plus dish. So at first I considered having just a narrowband setup.



Anyway I managed to pick up the dish in the photo at a rally and although slightly heavier than I would have liked, I chose it to experiment with. The tripod is a caravan/camping satellite tripod but I beefed up the centre pole to handle the dish better.



For a LNB I use a bullseye as these are probably the most stable on the market and idea for narrowband.

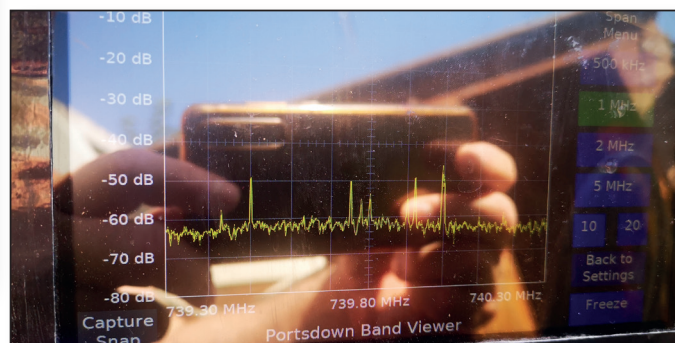


John G7JTT

For ease I knocked up a push-fit helix with dimensions as follows,

The reflector is 112mm round with a centre hole of 54mm (diameter of the LNB cap), the helix was wound on a 42mm plastic tube from 3mm LDF450 inner.

The nice thing about using LDF450 inner is that it is copper-coated aluminium so it's light and holds its shape. The loops are spaced at 30mm and to tune it adjust the first loop run parallel with the face of the LNB cap to get best match. I do lose about 2db with the helix on so only put it on when I transmit.



When I first set this all up I was able to use the Portsdown bandviewer to find the narrowband transponder easily and when I tried it on the wideband transponder:

I was surprised to see the beacon around 6db MER after some tweaking I got around 8db MER (no one else on the transponder) this really surprised me being as the dish is only effectively a 71cm dish.



So for RX at least this setup was more than useable, so next I tried a Stealth 25W PA which give around 10W clean DATV and using 333Ks 1/4 FEC - and I was in.

So while a larger dish is preferred and will give more reliable results don't dismiss a smaller dish and QRP power if you want to have a bit of fun at the same time. 🗣️



How to point an antenna if you are out portable?

Chris van den Berg PA3CRX

If you have found an interesting location to go portable, it is important to be well prepared and one aspect of this is the antenna direction.

It has happened to me several times. I thought I knew where the other station would be in relation to me. Turning the antenna back and forth over a certain angle did not produce the desired signals, but it turned out that the other station was located 90 degrees to where I thought it would be.

Asking the other station for the antenna direction and then pointing the antenna with a compass (with or without the smartphone) means additional actions. Hassle with lists, loose items that have to be dug out of a bag, whether or not in the rain (or worse).

Because most of the contacts to be attempted are with known stations, their location is also known in advance. The location is also known of our own portable location.

All that is needed is a high point, such as a church tower or a transmission tower that protrudes above the landscape. Its location can easily be determined with <https://k7fry.com/grid/>



► Portable location with 6 cm station and in the background a possible reference point

Then you can use the logbook excel sheet or the link mentioned above to determine the direction of the individual stations (and the high point) relative to the locator of the portable location.

Using a geo-triangle or a drawing program (even in Word), lines were drawn from a center with the angle (direction)

of the stations (and also the high point) involved. The (printed) result is glued to sturdy cardboard.

My camera tripod, which I use for my portable station, turned out to have a construction with more disks that could be unscrewed.

The cardboard disk could be nicely fixed between these disks. A sticker as a pointer on the rotating part completed this test setup.



► Cardboard construction with directions and call signs of potential stations

When I arrived at the location, I simply pointed the antenna to the high point, applied the arrow-shaped sticker to the relevant line and it was immediately clear where the antenna should be turned to for the other stations.

This worked excellent, the contacts were made quickly.

And what, if you do not see a high reference point? Then the pointer could be brought in position after contact with one station, the rest will then correspond with the lines on the cardboard.

However, if a station appeared with which no prior appointment had been made, it is still gambling.

Also, a new piece of cardboard must be made for each portable location. So would a scale in degrees not more handy?

For this purpose I purchased a (very cheap) 360 degree protractor, removed the pointer and cut the edge of an old CD as reinforcement that I mounted underneath.

A piece of white paper was placed between to ensure readability of the scale.

The pointer of the protractor is glued to a piece of cut open plastic tubing that could be clamped around the rotating part.



► The protractor, resized CD with paper and pointer

This construction replaced the cardboard in the tripod and I tried it in practice.

I pointed the antenna to the high point, turned the pointer to the relevant angle based on a list. - yes, again a list.



It then turned out that the degree scale was sometimes difficult to read.

The conclusion was that the cardboard version actually worked more conveniently, despite the mentioned disadvantages.

Actually, a combination of the protractor and a slightly larger disk (CD) with the calls of the involved stations would likely be the best.

Such construction will become somewhat larger and therefore more vulnerable during transport.

Maybe something to try next time.. 🤖

CAT 23 – a grand day out

Rob G8NXG



Once again the annual BATC CAT get-together was held at the Midlands Air Museum located in Baginton, near Coventry. This location has been used for CATs on previous occasions as it offers a central location for visitors, plus Birmingham Airport is not too far away for those who travel from afar.



The Covid pandemic has forced a change to the structure of our conferences and after a couple of years the format has settled to become a two-day event; the first day delivered as a get-together for members, plus a second day of presentations delivered via Zoom for all to watch and participate in, should you wish to.

Layout preparation for each CAT starts on the previous day of the event when the initial task of erecting around 25 tables is carried out, followed by the installation of equipment for the more complex demonstrations. In the days and weeks before that of course, participants prepare items to demonstrate and show etc.

Prior to the day itself a popular feature is the Saturday informal dinner held in a nearby hotel; this year at the Old Mill, Baginton. Once again the dinner was well attended and the hope is to increase the number of tables for people who wish to attend next year.



It's great to report that a few demonstrations have become regulars. The duo of Jen G4HIZ and Joan 2E0HIZ arrived all the way from Kent and installed one of the larger stands plus the dish outside. This familiar stand included ATV via QO-100 and a 6 cm FM ATV station using modules intended for use in drones.

Dave G8GKQ worked the Portsdown clinic while Clive G3GJA and Lyndon M0LDR manned the test and fix-it clinic. Next to this was the BATC shop, featuring the special rally prices and manned by Noel, G8GTZ.

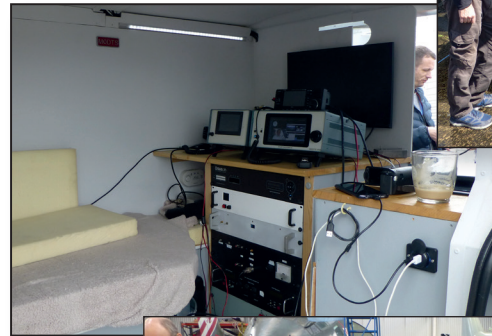
The ex-BBC OB van MCR21 was represented again by Brian G8GQS, who is also one of the team leaders involved in reworking MCR21 to its original 1960s specification. All is explained at mcr21.org.uk.



The bring and buy stands featured among others our esteemed CQ-TV Editor, Frank M0AEU and new this year the Wolverhampton ARC.

Also new this year was the appearance of Kevin, G3AAF who presented a range of interesting products for sale including many from RF Design. Another new innovation was the demonstration by Justin, G8YTZ who demonstrated the complete works of an ATV repeater.

Outside the hangar, Gareth G4XAT parked his mobile ATV station and fielded many questions from interested members. Similarly, we were able to also welcome Rob M0DTS, who arrived with his 'portable' van-based ATV station.



Some 70 members turned up to enjoy the day and although one heavy rain shower appeared (it is England after all) the remainder of the day was spent in pleasant weather conditions. Judging by the various bits of equipment being purchased and taken out early in the day there were a number of bargains to be had.

We are indebted to everyone who turned up to participate; it was a great CAT and I apologise for any omissions.

The second part of CAT 23 will be held via Zoom on Saturday 21 October – check the BATC forum for the agenda. 🗨️



News from Japan – 358 km, 5.7GHz, DATV Success

Fumio Sekizaki, JA0RUZ

On 29 and 30 July, I started the Nihonkai Duct DX Challenge with the JA0GPO station in Nagano at seven o'clock and went to the vicinity of Meotoiwa Rock in Shika Town on the Noto Peninsula and Mt. Houdatsuyama.



My communication partner station was a JA4JKE station moving near Takohana, Matsue City, Shimane Prefecture, near Tenku, Misaki, and the main purpose is 5.7GHz and 10.2GHz FM and FHD-ATV (ISDB-T) communication.

According to the forecast for the Sea of Japan duct on this day, the conditions were not very good, but the schedules of both sides matched, so we decided to go ahead with it.

On the 29th, I tried the approximately 366km between Takohana, Matsue City, Shimane Prefecture and Shika Town, Ishikawa Prefecture. On FM, I received a strong signal of about 59 + 60dB (reading the S meter of IC-1275 with TRV connection), but it is impossible to make a video with such a thing. He can't see the ISDB-T image unless it's 30-40dB stronger. We tried for several hours, but could not reach full high-definition image communication.

After that, he joined the JA9BPH station at the nearby "Ganmon Cliff Park" from the morning, and after joining the JA9BPH station, he was advised by a certain local government official that "a good point with a good view for wireless operation".

Dismantled after previewing. (However, the direction of the opening is bad) When you are doing something unfamiliar to you near the coastline, you will see most of the civil servants.



I got it.

This kind of thing happens quite often, so I will use Novolibata to make it visible even from a distance, saying, "Amateur radio station radio wave propagation experiments in progress"!

On the next day, the 30th, we changed our schedule and headed to Mt. Houdatsu, this time about 358km, and tried again. The difference in distance has almost no effect, but I thought that the heat would be different because it would be a little higher. Mt. Houdatsu was under construction in various places, so I set it up at the mountain's entrance. A signal came in, so I hurriedly replaced the FHD-ATV, and surprisingly the video signal could be decoded. After a while and fine-tuning the beam, a full high-definition image was seen.



This was a distance that I had never tried before, but the JA0GPO station was also able to succeed in two-way communication with 5.7GHz FHD-ATV with a distance of 358km at the same time.

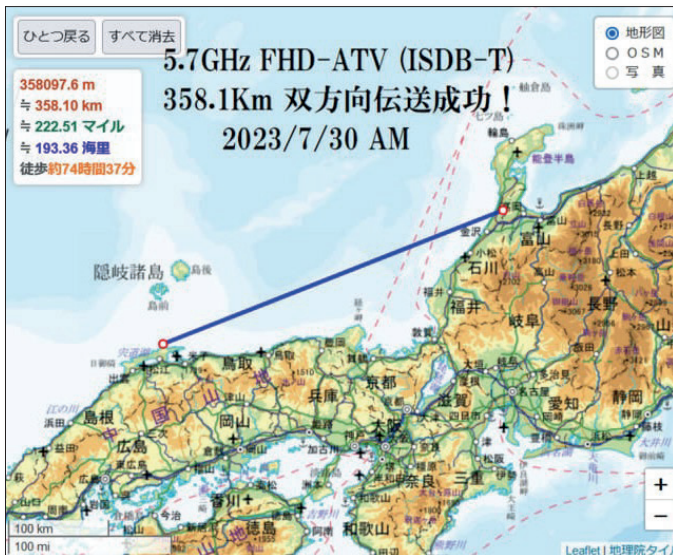
See evidence video on You-Tube.

<https://youtu.be/bZENy5cvl4M>

I think this is probably the first time in the world that this full high-definition ATV has successfully communicated over a 358 km non-line-of-sight path.

We used 64QAM RF output at 5.7GHz was about 0.3W~0.6W, and he used a 60cm~100cm parabola and were able to communicate in two-way.

This is the furthest distance even in Japan, but I'm curious about the world record for Full-HD ATV (1920 x 1080 30fps).



In addition, we operated using a 430 MHz, 20 Watt, 10-element Yagi antenna, but this time it was not FS with 430MHz, and it was operated under conditions that could not be said to be a strong duct, but 5.7 GHz has been very strong. It has been successful at times.

In other words, the propagation of V/U in the Sea of Japan duct can only be used as a reference, and we have come to understand that microwave propagation cannot be understood unless you try it. However, it would be a waste to not use such a wonderful propagation because of wrong subconsciousness.

After all, the mobile operation this time was a fight against the heat wave, and it was operated in a situation where both people and equipment were considerably down during the preparation stage, and even smartphones could not work properly. FHD-ATV video transmission and reception equipment and other troubles have come out many times. In addition, 10.2GHz did not improve the duct condition, so I gave up with only FS of FM this time.

However, the Sea of Japan Duct is addictive! 🎮

73 de Fumio, JA0RUZ,
Email: ruz@cap.ocn.ne.jp

Modbus controlling of PAs with Arduino boards

Rob PE/CHY



As (D)ATV amateur we all know, cable losses are severe and antenna cables should be as short as possible. One way to achieve this is placing the power amplifier as close as possible to the antenna. With the PA somewhere in the garden or antenna mast you may still want to control and monitor the operating parameters such as RF output power, VSWR, drain currents, heatsink temperature etc. So if you have multiple PAs you will need a lot of multi-core cabling and big multi pole connectors.

I have chosen another approach, the PAs for 23cm, 6cm and 3cm (all outside the shack) are controlled via a single four-wire cable. Two wires for Gnd and +24V dc and another two wires for RS485 communication. This protocol allows connection to multiple devices over one single pair of wires.

I am not an expert in writing C/C++ code so I looked for a suitable existing library for the famous Arduino boards. I found a fairly simple to use “Modbus” library ¹ and used it for my project.

The Modbus protocol is a communication protocol for sensors and actuators in an industrial environment. It is fairly robust and allows long cable runs. It works with a single master and one or more slaves, each slave individually addressable.

The Arduino library is a limited version of the official protocol, so how does it work?

The “master” is in my case the ATV transmitter in the shack. It contains an Arduino Mega 2560 board, the slaves are the PAs outside , they each have an Arduino Nano board. In the master you can define any number of read or write registers (variables).

In the slaves you have to define the same number of registers. The Modbus library runs “in the background” and continuously synchronises all registers. All you have to do from a software point of view is to read from or write to one of those registers. An example:

The 3cm slave unit has a heatsink temperature sensor. The slave Nano continuously reads this sensor and

puts the value in its “temperature” register. The master automatically receives the actual value in its own “temperature” register belonging to the 3cm PA slave. When you want to know the actual temperature you only have to read that register and display it together with some suitable text like “heatsink temp: 48°C”.

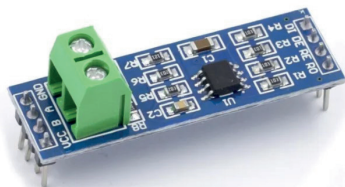
The more slaves you have and the more registers in each slave, the slower the update of registers goes. If one of the slaves doesn't respond in time to the update request, the master retries for a given number of times. If all retries where unsuccessful, an “error flag” is risen and further communication to that particular slave is stopped. The user program has to deal with this and may show a warning message to the user like “3cm PA not online”

Hardware

The Arduino boards have RS232 ports, this must be converted to RS485. Small and cheap TTL to RS485 interface board are easily available :

Alternative chips are:

- ▶ LT1485
- ▶ 7LBI84 (slew rate limited)
- ▶ SN65HVD12 (slew rate limited)



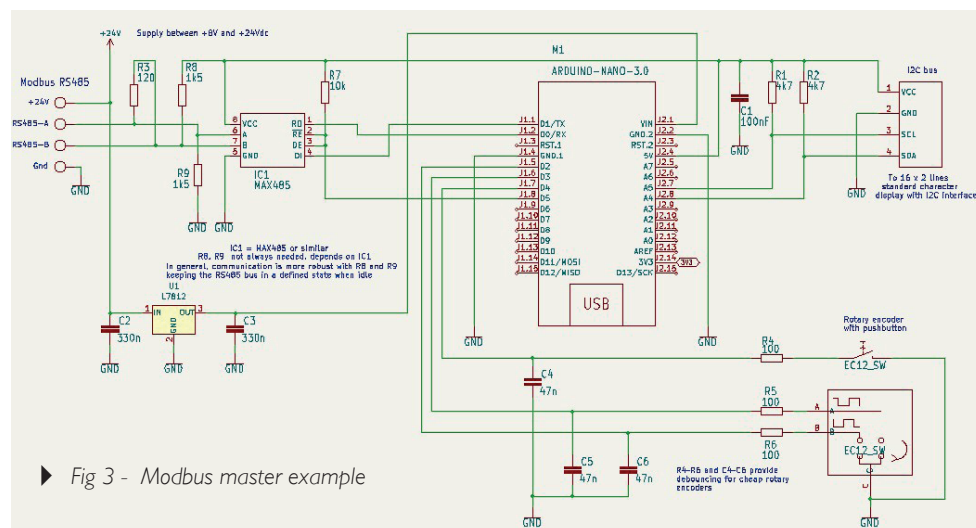
▶ Fig 2 - RS485 interface circuit

Slew-rate limited versions will produce less RF noise on amateur bands but will limit the baud rate to 115k2. This is more than enough for our application.

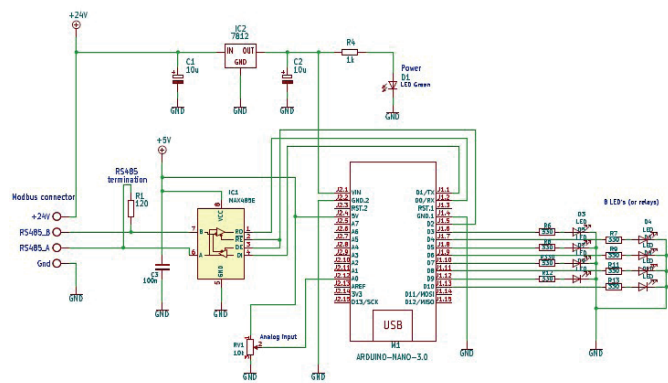
A simple circuit master and slave is given below:

R3 is the RS485 termination resistor; in any RS485 chain there should be one termination resistor on both end of the chain.

R4, 5, 6 and C4, 5, 6 are bouncing suppressors, needed for cheap rotary encoders. A standard LCD character display with i2c interface is connected to the i2c bus.



▶ Fig 3 - Modbus master example



▶ Fig 4 - Modbus slave example

The slave example uses a potentiometer to simulate an analog sensor and eight LEDs to show the output for controlling relays etc.

Software

The master and slave software shows the capabilities of the Arduino Modbus library. More slaves and more registers per slave could be added for more functionality. The Arduino Nano has only one RS232 port, this is impractical for experimenting and developing the software. So I would advise to use an Arduino Mega2560 board with four RS232 ports. Serial port zero is the port for uploading the software to the board, serial port one could be used for connection to the RS485 converter chip. This makes it possible to use the serial console on the Arduino IDE while the Modbus is active.

Master software

In the “setup” part you need to configure the Modbus function, tell exactly how many slaves you want and how many write and read registers. And a few other parameters need to be defined, like baud rate and the serial port number.

For inexperienced C/C++ users this needs a little further explanation, see example below.

1. tells the compiler to include the Arduino Modbus library.
2. sets the baud rate, lower baud rates are more robust with long cable runs. Should be the same for the slaves.
3. defines the output pin used for the Tx/Rx direction on the RS485 bus, this could be any free digital output pin on the Arduino board.

► Fig 5 – Master setup part

```

13 #include <SimpleModbusMaster.h>
14
15 LiquidCrystal_I2C lcd(0x27,16,2); // set the LCD address to 0x27 for a 20 chars and 4 line display
16 #define adr0 0 //eeprom save address
17 #define Rot_A 3 //rotary encoder defines
18 #define Rot_B 2
19 #define Rot_enter 4
20
21 //modbus settings
22 #define baud 9600
23 #define timeout 1000
24 #define polling 10 // the scan rate
25 #define retry_count 100
26 // used to toggle the receive/transmit pin on the driver
27 #define TxEnablePin 5
28 // The total amount of available memory on the master to store data
29 #define TOTAL_NO_OF_REGISTERS 2
30
31 enum
32 {
33     PACKET1,
34     PACKET2,
35     TOTAL_NO_OF_PACKETS // leave this last entry
36 };
37
38 // Create an array of Packets to be configured
39 Packet packets[TOTAL_NO_OF_PACKETS];
40
41 // Masters register array
42 unsigned int regs[TOTAL_NO_OF_REGISTERS];
43
44 unsigned int counter=0;
45 unsigned int counter_old;
46 bool rystat=0;
47 bool Ry[8];
48 unsigned char RELAYS=0;
49 byte rotary;
50 byte up;
51
52 void setup() {
53     // Initialize each packet
54     modbus_construct(&packets[PACKET1], 1, PRESET_MULTIPLE_REGISTERS, 0, 1, 0); //write to slave regs[0]
55     modbus_construct(&packets[PACKET2], 1, READ_HOLDING_REGISTERS, 1, 1, 1); //read from slave regs[1]
56     // Initialize the Modbus Finite State Machine
57     modbus_configure(&Serial, baud, SERIAL_8N2, timeout, polling, retry_count, TxEnablePin, packets, TOTAL_NO_OF_PACKETS, :

```

4. sets the total number of registers used. When you need (for example) two slaves, Slave one with three write registers and one read register, and Slave two with two write registers and four read registers, the total number of registers would be 10.
5. sets the number of packets. For each slave you need one packet for the write registers and one packet for the read registers. So in the example above you would need four packets.
6. defines which read and write registers are used and to which slave they belong. The registers in the Master form an array and are numbered like any array: reg[0], reg[1], etc. In the "loop" part of the Arduino software you can access any register with instructions as STATUS = reg[7]; where the variable "STATUS" is filled with the content of the read register reg[7].

There must be a modbus_construct line for each packet, starting with the packet number, then the slave address, then if it needs to be a write register "PRESET_MULTIPLE_REGISTERS" or read register "READ_HOLDING_REGISTERS" and finally three numbers, the first number is the first slave register number in this packet, the second number the total number of registers

in this packet and the last number is the first master register number.

So when you have two slaves, Slave one with four write registers and Slave two with just one write register, in the master you have regs[0] up to regs[3] for the first slave and regs[4] for the second slave. The three numbers for the first packet would be 0,4,0 and for the second packet 0,1,4

Line 57 sets the remaining parameters : the serial port number: &Serial for serial port0 and &Serial1 for serial port1. The remaining part of this line does not need to be modified.

The "loop" part of the program

Somewhere in the loop part the line modbus_update(); must be added. Every time when the program passes this line, the registers in the master and slaves are synchronised.

Beware, when the program hangs or is looping in some function like the infamous delay(xx); the updates are suspended. This situation should be avoided or at least properly dealt with. More advanced use: every packet is a so-called structure (struct) , it contains several parameters. One element of the structure contains the number of failed requests. After the modbus_update(); function you could look at this parameter:

```

Unsigned int err;
Modbus_update();
err = packets[PACKET1].failed_requests;

```

The number found in err should be zero in normal condition, when it is above 0 there were some communication errors. More info about the packet structure in SimpleModbusManual.pdf^{*1}

► Fig 6 – Slave setup part

```

8 #include <SimpleModbusSlave.h> ← 1
9
10 #define SLAVE_ID 1 // modbus slave address ← 2
11 #define TX_RX 2 // RS485 Rx/Tx changeover ← 3
12 #define potmeter A0 // analog input for sensor demo
13
14 #define RY1 10 // relays <> digital pins
15 #define RY2 9
16 #define RY3 8
17 #define RY4 7
18 #define RY5 6
19 #define RY6 5
20 #define RY7 4
21 #define RY8 3
22
23 unsigned char RELAYS = 0;
24 unsigned char RELAYS_OLD=0;
25
26 // Using the enum instruction allows for an easy method for adding and
27 // removing registers. Doing it this way saves you #defining the size
28 // of your slaves register array each time you want to add more registers
29 // and at a glimpse informs you of your slaves register layout.
30
31 // registers of your slave //
32 enum
33 {
34 // just add or remove registers and your good to go...
35 // The first register starts at address 0
36 REG_1, ← 4
37 REG_2,
38 HOLDING_REGS_SIZE // leave this one
39 // total number of registers for function 3 and 16 share the same register array
40 // i.e. the same address space
41 };
42
43 unsigned int holdingRegs[HOLDING_REGS_SIZE]; // function 3 and 16 register array
44
45 void setup()
46 {
47 modbus_configure(&Serial, 9600, SERIAL_8N2, SLAVE_ID, TX_RX, HOLDING_REGS_SIZE, holdingRegs); ← 5

```

Slave software

The slave software uses another Modbus library, SimpleModbusSlave. Similar to the master a few things have to be set before you can use it.

1. Add the header file for the Modbus slave utilities
2. Sets the slave address, starts with 1
3. Sets the digital output pin of the Arduino board for RS485 transmit/ receive changeover.
4. Sets the number of used registers within this slave, this could be any mix of read and write registers.
5. Sets the used serial port, for an Arduino Nano this is always serial port 0. Also the baud rate needs to be set, this should match the masters baud rate.

Inside the “loop”

As with the master software, somewhere in the loop the modbus_update function should be called.

Writing to a register: holdingRegs[xx] = data;

Reading from a register: data = holdingRegs[xx];

For the complete example see *2. To check this out you need to build the hardware as shown in fig 3 & 4 and load the programs in the Nano boards.

It should give you a good idea about the possibilities and you can easily experiment with it and adapt it to your own needs.

At the link shown above you can also find the complete software and hardware used in my QO100 power amplifier and another Modbus example, my 23-6-3 cm Analog-FM transmitter with external power amplifiers, all controlled via Modbus. 🗣️

Footnotes:

The original library is written by Juan Bester in 2012 and modified by various people. You can find the libraries at Github, the .zip file contains the master and slave libraries and a description for use

*1 | <https://github.com/charlesbaynham/simple-modbus>

*2 | Online content: <https://qsl.net/pe1chy>



IARU Region 1 ATV contest 2023 results

Dave, G8GKQ

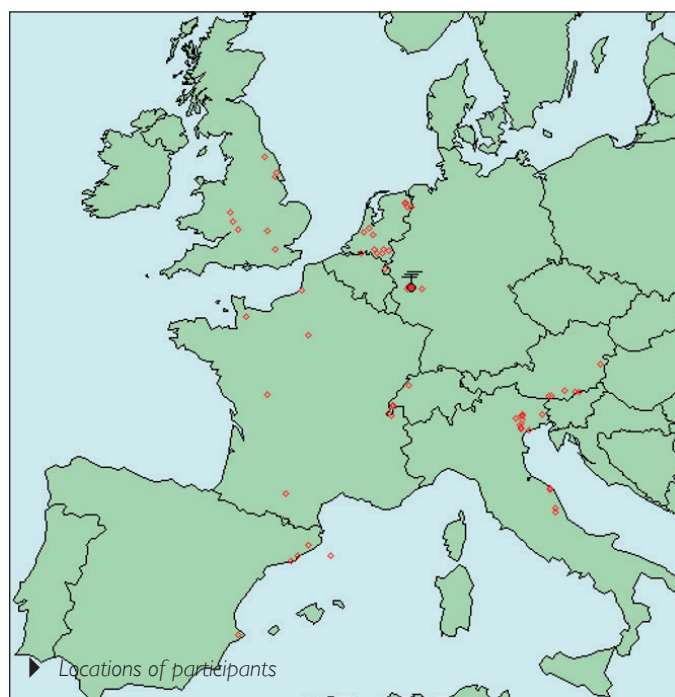
The IARU Region 1 ATV contest was held on 10/11 June 2023 with 62 entrants from nine countries competing, using bands from 50 MHz to 47 GHz.

For the second year running, the overall winner was Erwin OE8EGK, who was one of a number of stations who maximised their points through roving to multiple sites. Lex PE1CVJ won the 50 MHz section.

There were not as many UK entries as in previous years; well done to Rob M0DTS who was the highest scoring UK station.

The full results can be found at https://wiki.batc.org.uk/IARU_ATV_contest_2023_International_Results

Please don't forget next year's IARU ATV Contest on 8/9 June 2024. I will not be coordinating the 2024 Contest and a volunteer to replace me has yet to be found. If you are prepared to take on the role and help promote your hobby, please contact me at atv@iaru-r1.org.



IARU scores			
Pos	Call	IARU score	Locator
1	OE8EGK	26695	JN76LP
			JN76NP
			JN76FR
2	OE8FNK	22955	JN66UO
			JN66VO
			JN87DK
3	OE8KVK	14855	JN66UO
			JN66VO
4	IQ3ZB	13933	JN65AW
5	OE8III	11130	JN66UO
			JN66VO
6	IW3RMR	10854	JN66PA
7	IK3UVC	10822	JN65HM
8	HB9TV	10640	JN37MD
9	IU3OGL	10442	JN65HM
10	HB9DUG	8414	JN36DK
			JN36DL
			JN36DL
11=	IQ3TR	7320	JN66EB

11=	I3FIW	7320	JN66EB
13	F9ZG	7255	IN99KC
14	PA0BOJ	7170	JO21ON
15	IK3HHG	6273	JN65DO
16	M0DTS	6183	IO94LI
17	F3YX	5375	JN18AP
18	IZ3PWF	5282	JN65AW
19	ON7MOR	4814	JO21GK
20	PE1CVJ	4793	JO22KG
21	IW6ATU	4720	JN63QN
22	PA0T	4314	JO33JC
23	PA3DLJ	4286	JO20VW
24=	DC8UG	4096	JO30UG
24=	DK7UP	4096	JO30NI
			JO30LG
			JO30MJ
26	I3QAE	3872	JN66EA
27	G4FRE	3775	IO82RJ
			IO82TC
28	PE1MPZ	3637	JO22NB
29	HB9AFO	3555	JN36CD
30	PA7HV	3316	JO21TK
31	PA3FXB	3239	JO33KC

32	F5AGO	2936	JN06DP
33	PEI ITR	2816	JO21QK
34	G3VKV	2795	IO81XV
35	IW3HYS	2346	JN66DA
36	G4CPE	1923	IO91SW
37	EG5DATV	1535	IM98XR
38	IW3FCI	1515	JN66EB
39	IW6CHN	1460	JN62SW JN62ST
40	PA3BYV	1422	JO32NX
41	I3GXC	1347	JN65DS
42	PEIAPH	1164	JO21XM
43	IU3KMM	957	JN65DP JN65CR
44	HB9IAM	922	JN36BF
45	F6BGR	918	JO00SC
46	PEIOLR	800	JO21UN
47	F1CSY	740	JN03SK
48	M0YDH	621	IO82RJ
49=	IU3KKY	534	JN65CR
49=	G4YTV	534	IO93UU
51	IZ3NVT	472	JN66EA
52	EA3IGB	439	JN11TM
53	EB3FYO	410	JN11HT
54	EA3XU	356	JN11CK
55	EA3UM	330	JN01XG
56	G8TA	210	IO82RJ
57	G4XAT	151	JO01AI
58	PA0RWE	132	JO22HC
59	G3GJA	90	IO93TR
60	IU3NMQ	52	JN65EV
61	PI4KST	36	JO32LX
62	IW6DCN	20	JN63QO

Band Winners

Band	Entries	Winner
6 m	1	PEICVJ
2 m	4	M0YDH
70 cm	39	F5AGO
23 cm	45	IQ3ZB
13 cm	39	OE8EGK
9 cm	10	OE8EGK
6 cm	21	OE8EGK
3 cm	29	OE8EGK
1.2 cm	5	HB9TV
0.6 cm	1	G4FRE

Country Winners

Nation	Entries	Winner
Austria	4	OE8EGK
Belgium	1	ON7MOR
France	5	F9ZG
Germany	2	DK7UP DC8UG
Italy	19	IQ3ZB
Netherlands	13	PA0BOJ
Spain	5	EG5DATV
Switzerland	4	HB9TV
UK	9	M0DTS

Best DX

Band	From	To	Dist
6 m	PEICVJ	PEIASH	8
2 m	M0YDH/P	G3VKV	65
70 cm	M0DTS/P	PEICVJ	454
23 cm	M0DTS/P	PEICVJ	454
13 cm	HB9TV/P	HB9AFO/P	128
9 cm	OE8EGK/P	OE8FNK/P	125
6 cm	OE8EGK/P	OE8FNK/P	125
3 cm	F3YX	F9ZG	237
1.2 cm	HB9TV/P	HB9AFO/P	128
0.6 cm	G4FRE/P	G4NXO/P	29

2m Results

Pos	Call	Locator	QSOs	Points	Best DX	At	Distance
1	M0YDH/P	IO82RJ	2	135	G3VKV	IO81XV	65
2	G3VKV	IO81XV35	1	130	M0YDH/P	IO82RJ	65
3	G4XAT	JO01AI	1	10	G8YTZ	JO01AJ	5
4	G8TA/P	IO82RJ	1	5	M0YDH/P	IO82RJ	5

6m Results

Pos	Call	Locator	QSOs	Points	Best DX	At	Distance
1	PEICVJ	JO22KG	1	8	PEIASH	JO22KF	8



The Charon, a HF up-converter for the Adalm Pluto

Gareth G4XAT

I heard and saw this mentioned by Benno PA0FBX on one of the BATC Thursday QO-100 nets and thought 'what a useful little add-on'.

So for just a bit over £100 I ordered once from the supplier/builder <https://dxpatrol.pt/produto/adalm-pluto-hf-transverter-charon/> and was pleased to receive the unit seven days later. The manual for the unit is here <https://dxpatrol.pt/wp-content/uploads/2023/06/pluto-Transverter-manual.pdf>

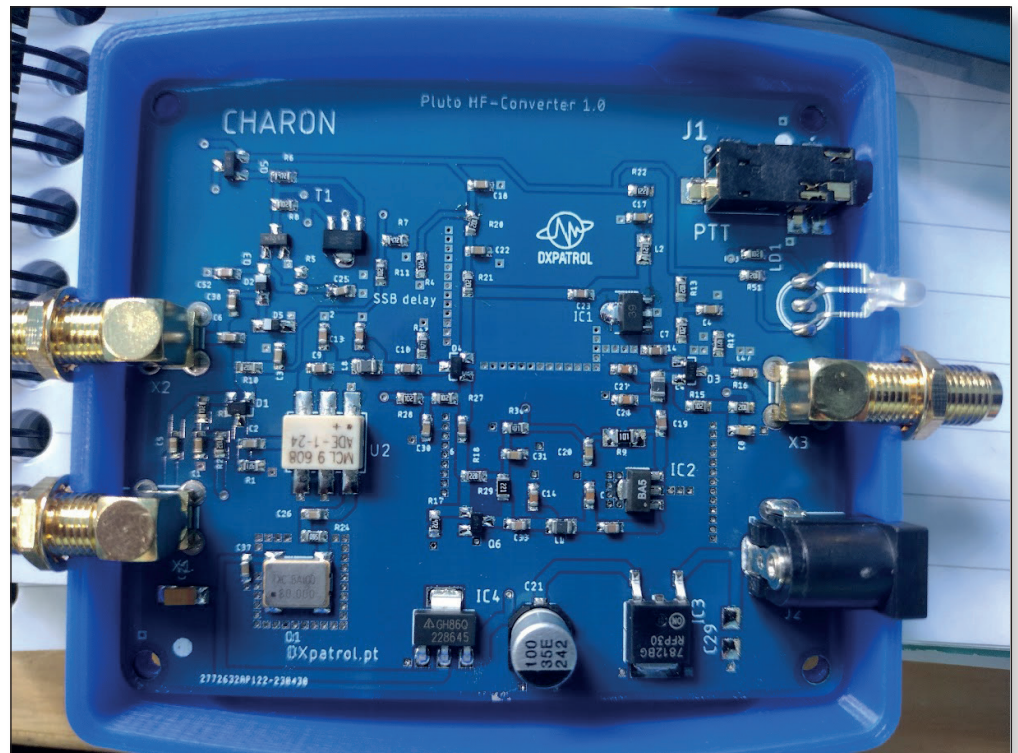
Benno did say that, like the Pluto, the output and input will need an array of suitable filters adding, but the pile of 'it will come in useful one day' did indeed live up to its name and yielded a multi-band RX filter bank for HF and also a Racal eight-band 250W filter unit removed from a military amplifier I dismantled along the way.

While originally intended for a RPi-based Red Pitaya HF transceiver, the attraction of trying one of these units for DATV proved irresistible.

To add to the project, a rather wonderful broadband amplifier (2-200MHz and very linear, surplus from some medical imaging equipment) was tested on DATV and deemed perfect with a DATV output of at least 100W all the way from 1.8 to 146MHz.

Unboxing involved the usual navigation past sticky tape and packaging and it was simply connected via the supplied SMA leads to my PD4. I made up a quick power splitter lead to deliver the required 12VDC (which is then internally regulated as required) and connected it up. Although I have a 10m transverter (one of Mike G0MJW's designs) that has shown to work well, I don't have any 50MHz capability so I dialled up 130.7MHz on my Portsdown and selected TX.

Out popped a lovely 50.7MHz DATV carrier along with shall we say, sundry sprogs. Attempts at decoding this directly with my Knucker running on another PD4



did not yield results. A sanity check (131MHz TX on Pluto to Knucker on 131 MHz gave a quick lock, so theres something else getting in there.

Further investigation with my trusty spectrum analyser showed the usual enormous UK terrestrial signals (shack is LOS to Crystal Palace mast) so the poor Knucker did not know what to decode. There is some gain in the Charon TX path, I suspect that further shielding of the nice little 3D printed case (easily achieved with some spray-on nickel anti-RFI coating) and decent low-pass filtering may well sort out the undesirable components.

With the Langstone, it worked fine even below top band and with no filtering - I was listening to an AM station on MW. A quick (and unfiltered) scan of the HF bands shows that it works fine there too, even on 20m CW where stations were abundant on my HF antenna.

So preliminary tests show that it should work fine for DATV, although filtering is clearly needed on the TX side. The Pluto needs to be pretty much 'flat-out' for the on-board RFVOX sensing to work, but there is the option of hardwire control via a 3.5mm jack so that isn't an issue. My PD4 PTT open relay contacts will furnish that no problem.

So, anyone for Top Band DATV? 📡

Turning Back the Pages

A dip into the archives of CQ-TV, looking at the issue of 48 years ago

Peter Delaney - G8KZG

CQ-TV 92

BATC had held an SSTV Convention at Aston University the month before this edition of CQ-TV appeared, and so not surprisingly slow scan television featured strongly. Over 100 people had attended the convention, which included displays by firms selling commercially available equipment as well as the exhibits provided by several amateurs who were active users of the mode. A lecture programme included one on the history of sstv, given by Gordon Sharpley, and several taped lectures from the Dayton, Ohio, Convention. Several members showed keyboards for inputting text to a slow scan image, such as that built by Keith Clarke, G3KRC, which produced the display illustrated on the CQ-TV cover.

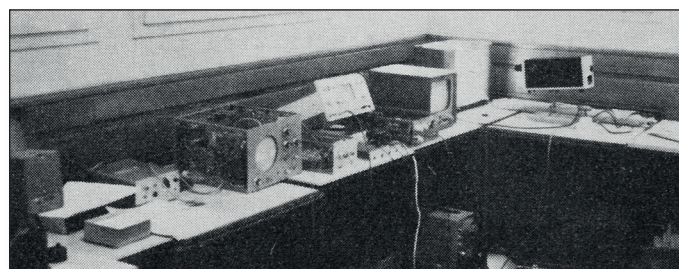


A new innovation at the time was the use of digital circuitry for the conversion between slow scan and fast scan television formats. Volker Wrasse, DL2R2 had brought his set up from Germany to demonstrate his equipment that could enable a slow scan signal to be displayed on a normal fast scan television monitor.



(The keyboard in the foreground was another way to make text on an sstv picture, this one made by Richard Thurlow, G3WWV).

A converter working in the reverse direction, that could sample a fast scan signal to generate a slow scan one, was part of an extensive display of slow scan equipment by Grant Dixon, G8CGK.



Some of the technical articles also were with slow scan in mind. Peter Helm, G8AEN had designed a filter for converting the frequency tones of an sstv signal into the corresponding varying voltage.

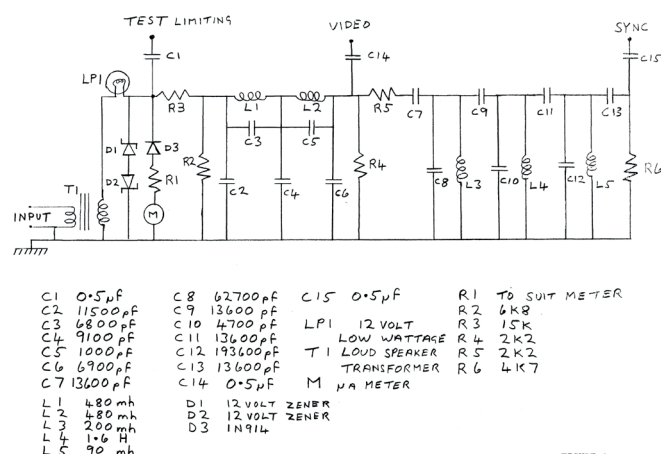
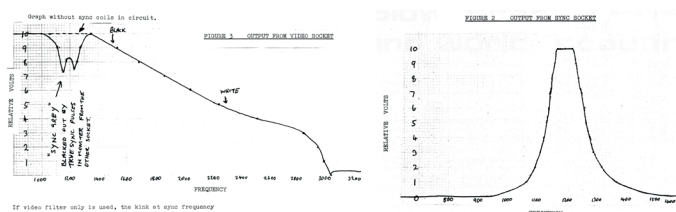


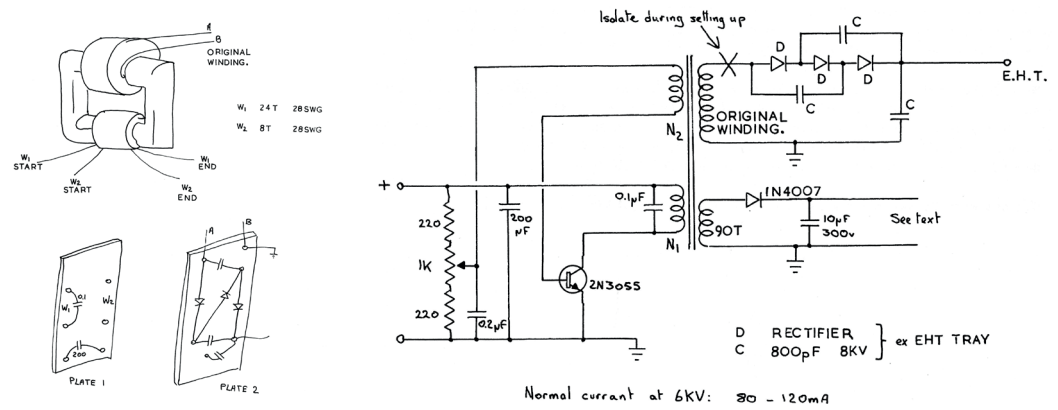
FIGURE 1

The video and sync outputs were shown graphically.



As the line of an sstv picture takes 60 mS, and the frame about 8 seconds (it varies between 50 Hz and 60 Hz mains supply countries) the usual way to display sstv images, unless using one of the scan converter circuits, was to use a crt with a relatively long persistence phosphor. Fast scan televisions used the line scanning signal as the basis for generating the eht supply, but in a slow scan system this was not fast enough. J Brown, G3LPB, had therefore developed a transistorised unit for the purpose. The transformer was one used in a domestic receiver, with all the primary windings removed and replaced. The primary windings were 24 turns of 28 swg enamelled copper in the 2N3055 collector circuit, and 8 turns in

the base circuit. An extra winding of 90 turns of 30 swg wire could be added to provide a 250 volt supply for the brilliance control, the best eht available being around 9 kV when the supply to the 2N3055 was 18V.



John Lawrence's Circuit Notebook included a useful table of crt phosphors.

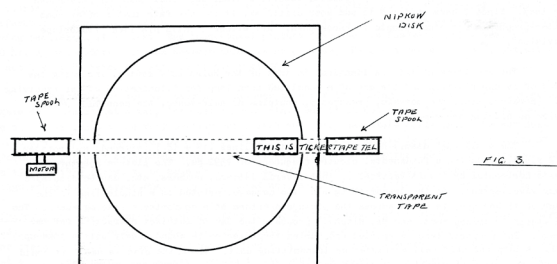
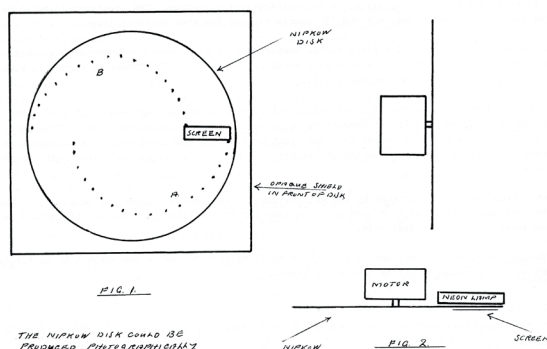
CATHODE RAY TUBE PHOSPHORS

EUROPEAN PRO- ELECTRON	OLD EURO- PEAN	EEV	GEC	OLD GEC	EIA JEDEC	FLUORESCENCE	PHOSPHORESC- ENCE (AFTER- GLOW)	PERSISTANCE (APPROX)	TYPICAL USE
BA	C	C	22		P16	Purplish - blue		Very short	Flying spot scanners
BC	V					Purplish - blue		Killed	Flying spot scanners
BD	A					Blue		Very short	
BE	B	P	08	E	P11	Blue	Blue	Medium short	Photographic recording
BF	U					Blue		Medium short	
GB	M		44		P32	Purplish - blue	Yellowish-green	Long	Medium and short range radar
GE	K	A	15	U	P24	Green	Green	Short	Flying spot scanners
GH	H	H	24		P31	Green	Green	Medium short	General purpose oscilloscopes
GJ	G	G	01	B	P1	Yellowish-green	Yellowish-green	Medium	Projection and oscilloscope
GK	G					Yellowish-green	Yellowish-green	Medium	Used in projection tubes
GL	N	N	25		P2	Yellowish-green	Yellowish-green	Medium short	Wide speed range oscilloscopes
GM	P	X	46	M	P7	Purplish - blue	Yellowish-green	Long	Radar and slow speed oscilloscopes
GN	J					Blue	Green (Infra - red excited)	Medium short (fluorescence)	
GP					P2	Bluish - green	Green	Medium short	Slow speed oscilloscopes
GR		E	29		P39	Green	Green	Long	Medium and short range radars, Anti-flicker displays
GU						White	White	Very short	
KA					P20	Yellow-green	Yellow-green	Medium	Oscilloscopes
LA	D	T	26			Orange	Orange	Medium	Anti-flicker displays
LB	E	S	27			Orange	Orange	Long	Medium and short range radar
LC	F	Z	19	T	P26	Orange	Orange	Very long	Long range radar
LD	L	Y	23	J	P33	Orange	Orange	Very long	Medium and short range radar
W	W	W	18	G	P4	White	White	Medium short	Television monitors
X	X				P22	Tri-colour screen			Colour television
YA	Y					Yellowish-orange	Yellowish-orange	Medium	
		V	02		P28	Yellowish-green	Yellowish-green	Long	Short range radar
			28			Orange	Orange	Long	Medium range radar
	U	B	30			Blue	Blue	Medium short	Projection
		D	31			Yellow-orange	Yellow-orange	Long	Short range radar Alfa-numeric
		U	33		P12	Orange	Orange	Long	Short range radar
		R	34			Red	Red	Medium	Projection
		F	47		P40	White (Med. short)	Yellowish-green	Long	Anti-flicker displays
					P14	Purplish-blue (Med. short)	Yellowish-orange	Medium	Low speed oscilloscopes

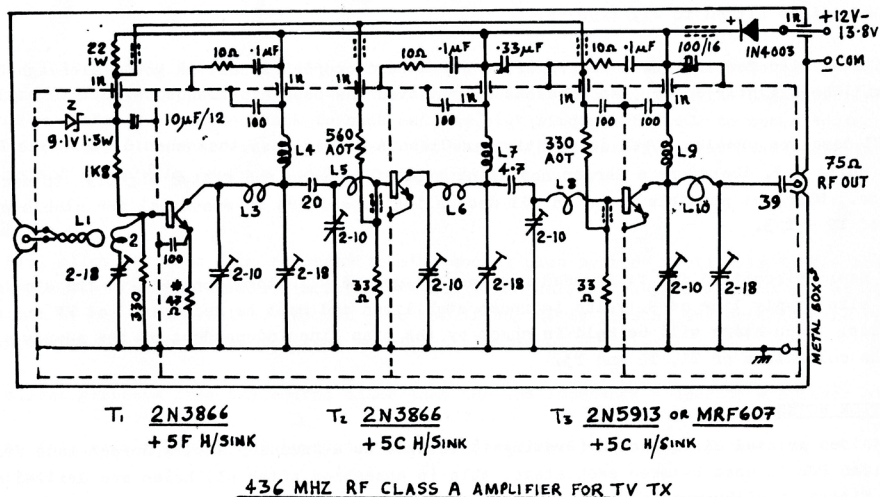
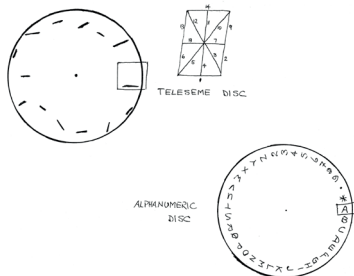
The persistence levels were defined as the time for the brightness to fall to 10% of its initial level:-

Very long - 1 sec or more; Long - 100 mS to 1 sec; Medium - 1 mS to 100 mS; Medium short - 10 μ S to 1 mS; Short - 1 μ S to 10 μ S; Very short - less than 1 μ S.

Other modes of atv were not forgotten in this issue - a novel scheme for producing characters in a low definition system was proposed by Edward Mitchell. This used a 3½" diameter 36 line Nipkow disc at the transmitter and receiver. The text would be black Letraset lettering put onto a transparent tape (which he called ticker tape), scanned by the disc, so the light passing through the tape fell onto a photocell behind it. At the receiver, a neon lamp would be modulated by the incoming signal to be viewed through the scanning disc.

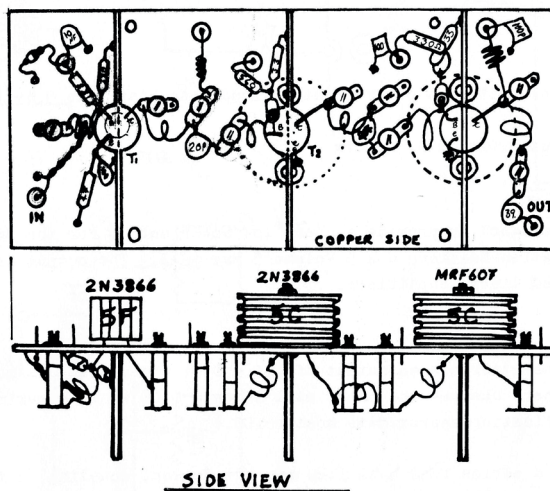


Doug Pitt observed that the mechanical set up for "Tickertape Television" was similar to that used by John Logie Baird, (and hence capable of transmitting more than just text), and suggested using either a 'Teleseme' disc (creating characters similar to the familiar 7 segment display), or using an alphanumeric disc similar to those used for high speed type-setting in the printing industry.



For use on the 70 cm band, P Johnson G6AFF/T had designed class A linear amplifier, which would give a 0.5 W output for a 50 mW input. It was developed to follow the output of the modular transmitter design that had appeared in the VHF Communication magazine in 1973, in order to drive higher powered linear amplifiers.

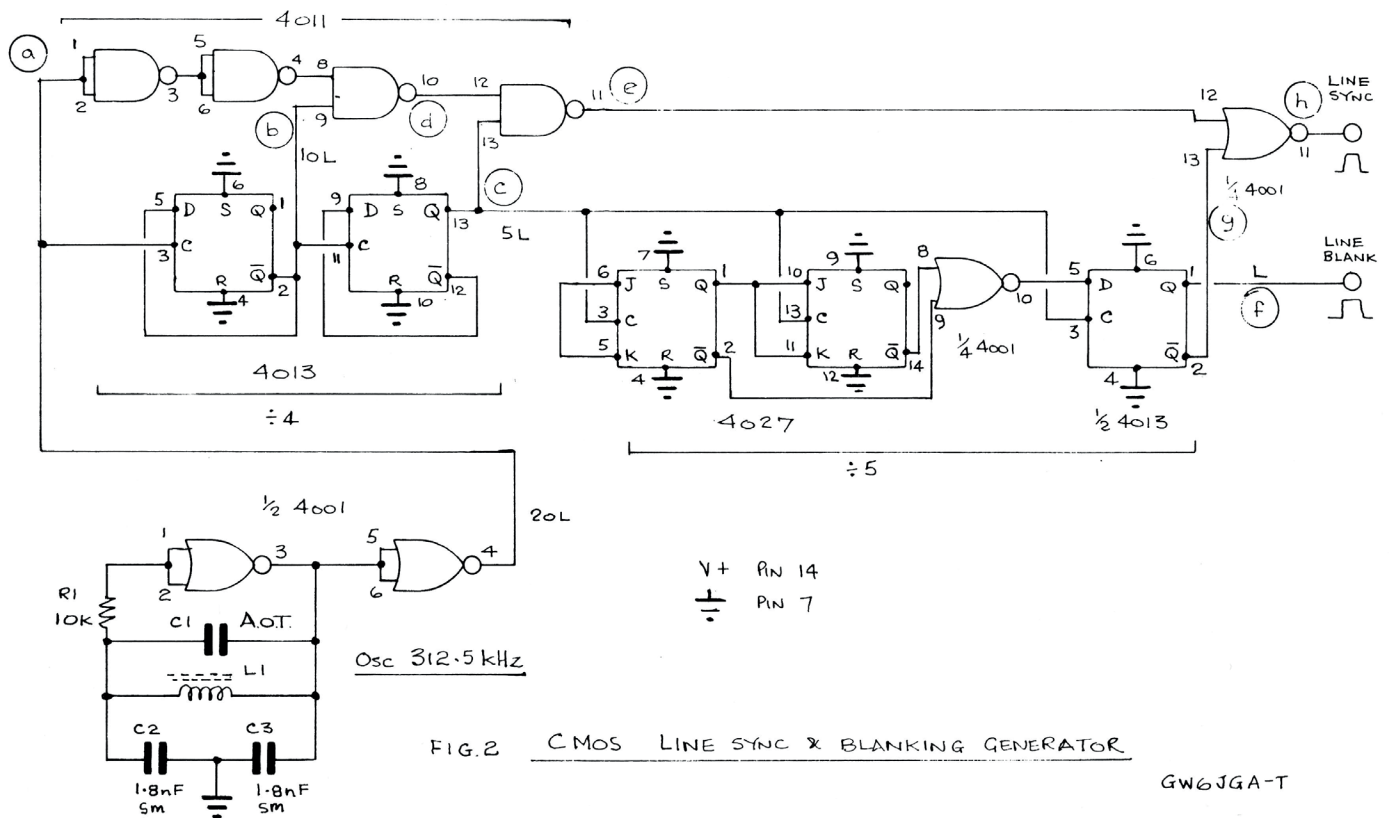
DWG 1 UNDERSIDE VIEW SHOWS GENERAL LAYOUT OF EACH STAGE (NOT TO SCALE)



SCREENS D5CB.

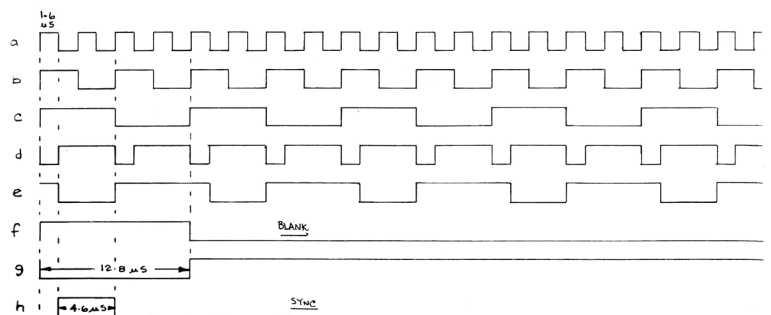
Assembly was on a piece of single sided printed circuit board, which provided a ground plane.

L1 was a piece of plastic covered tin-plated wire as a 1 turn loop, whilst inductors L1 to L7 were each 1¾ turns of 20 swg silver plated copper wire, wound to 6 mm diameter, 5 mm long with 3mm leads. L8 and L10 were each formed of 1½ turns 13 mm diameter of 14 swg tinned copper and L9 was 5 turns, 6½ mm diameter, of 22 swg enamelled copper wire, closely wound.



The other part of Circuit Notebook continued John's look at CMOS circuits, begun in the previous issue. This time, the application was for a 625 line sync and blanking pulse generator. The master oscillator, formed of half of a 4001 quad NOR gate device, ran at 20 times line frequency. The pulses were then fed to a divide by 4 counter, built around the 4013 D type flip-flop, and this was then divided by 5 in the 4027 (a dual J/K flip flop) and 4013 devices following to produce line blanking, with the line sync pulse formed by gating together the narrower pulse at (f) with inverted line blanking. As usual, John included

the waveforms at various parts of the design to help readers follow the sequence.



The BATC will have a stand at
 “Dag voor de RadioAmateur 2023”
 (The Day of the Radio Amateur)

<https://dvdra.veron.nl/>

To be held at Zwolle in the Netherlands
 On Saturday 28 October 2023

Please come and see us!

The British Amateur Television Club

The BATC logo is a blue square with rounded corners, featuring the letters 'BATC' in white, bold, sans-serif font. It is positioned in the top right corner of the page, partially overlapping a blue circular graphic element.

Out and About

Rallies and events with a BATC stand: (Provisional – subject to change)

14/15 October *RSGB Convention Milton Keynes*

15 October *Hornsea ARC Rally (No BATC Shop)*

21 October *BATC CAT 23 Part 2 (online)*

28 October *Dutch day of the radio amateur, Zwolle, NL. (No BATC shop)*

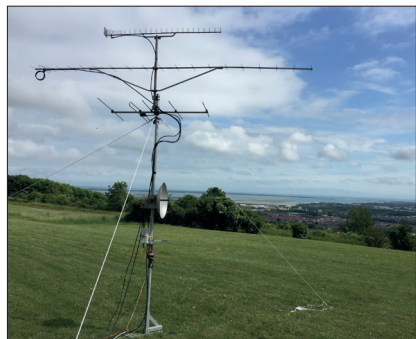
2 December *Midland Microwave Round Table (Shropshire)*

Unless otherwise stated, the BATC Shop will be available at all these rallies and will be offering cheaper prices than online, and accepting card payments.

The most up to date status can be found on this RSGB web page: <https://rsgb.org/main/news/rallies/>

If you are able to help on the BATC Rally stands, please contact the BATC secretary.

Activity Weekends & Contests



2023 Activity Days:

14/15 October Activity weekend - 2m and down + 23cm

11/12 November Activity weekend - 70cm and 23cm

9/10 December Activity weekend - 13cm and up plus 23cm
(coincides with Veron event)

The Christmas repeater and activity challenges will commence on 23 December 2023 and run until 2 Jan 2024.

BATC Online

Website: <http://www.batc.org.uk>

BATC Wiki: <https://wiki.batc.org.uk/>

Forum: <https://forum.batc.org.uk/>

Stream: <https://batc.org.uk/live/>

Dxspot: <https://dxspot.batc.org.uk/>

YouTube: <https://tinyurl.com/BATCYouTube>



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